

# NASA RESEARCH PARK

## DESIGN GUIDE

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NOVEMBER 2001



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# TABLE OF CONTENTS

**1 Introduction**

- 2 Overview
- Purpose
- Vision and Goals

**5 Ames Research Center**

**Land Use**

- 6 NASA Ames Research Center
- Bay View
- Air National Guard and Airfield

**11 Site Design**

- 12 Open Space Concept
- 18 Plaza Concept
- 24 Site Entrances
- 26 Circulation
- 34 Streetscape
- 56 Plant Materials

- 64 Hardscape Materials
- 66 Lighting and Site Furnishings
- 72 Public Art and Water Features
- 74 Signage
- 76 Infrastructure

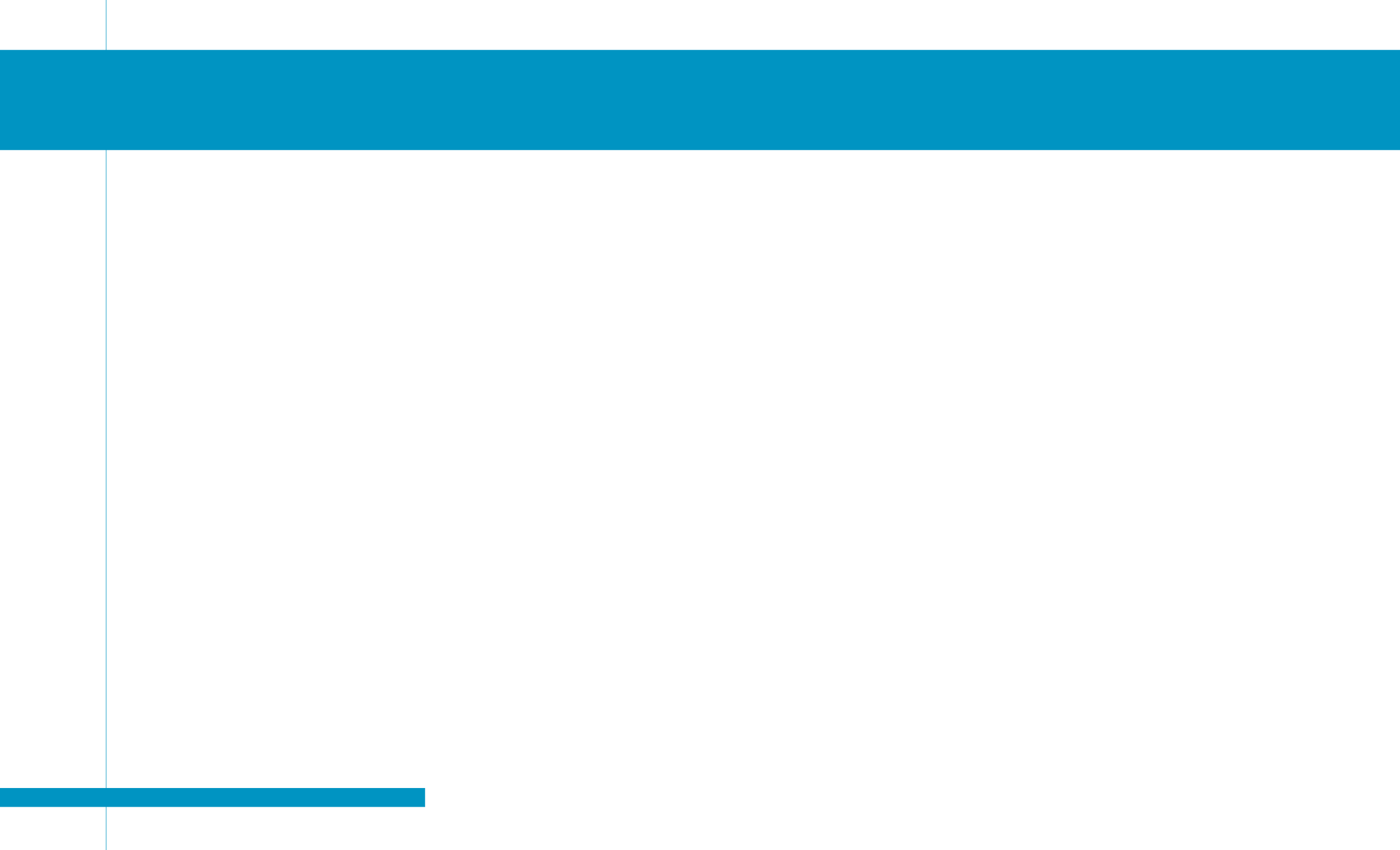
**81 Building Design**

- 82 Overall Design Strategy
- 84 Building Massing
- 88 Building Heights and Setbacks
- 92 Material and Color
- 96 Building Zones: Commercial/Institutional
- 104 Building Zones: Historic District
- 110 Service Entries/Loading
- 112 Sustainable Design

**117 Appendix**

- 118 Design Submittal Requirements
- 122 Definition of Terms

- 128 Reference Material
- 130 Preparers

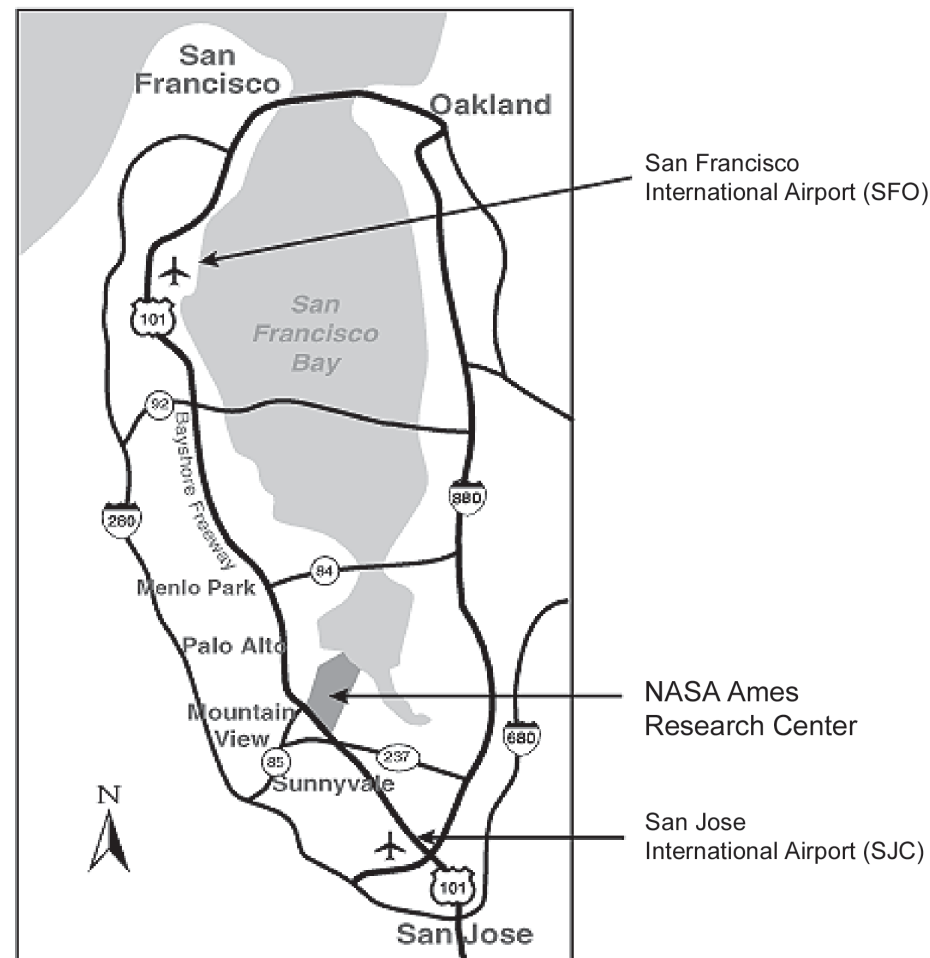


# INTRODUCTION

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## Overview

NASA's Ames Research Center is located in Moffett Field, on the border of the cities of Mountain View and Sunnyvale in northern California, at the southern end of San Francisco Bay. Occupying about 2000 acres of land, the Center sits as a prominent figure within the heart of Silicon Valley. With its large size and strategic location, the importance of the Ames Research Center has increased as it found itself surrounded by some of the world's leading technology institutions and industries. NASA, a leader itself in space research, has made the commitment to expand and participate with the dynamic community to which it belongs.



Site Location Map

## Purpose

The result of this resolution will inevitably lead to new construction and renovation in the site. And as new architecture, engineering and maintenance projects are carried out, they will affect the Center’s visual environment. Developed by a multi-discipline team of professionals in urban design, landscape architecture and architecture, the Design Guide is a resource for design professionals who complete such future projects at Ames, in order to maintain a certain degree of uniformity within that environment.

The Design Guide establishes a consistent and coherent direction for the many separate elements of the Center’s built environment—integrating site planning, planting, architecture, signage, lighting, roadways and other public works into a set of design decisions. It includes both qualitative guidelines and quantitative standards for all areas of the site. In addition, it addresses the planning issues associated with the various districts of Moffett Field in a way that recognizes the individual character of each area.

The guidelines described here are aimed at establishing the ideals of a general concept. This document recognizes that there may be a number of “correct” solutions within the established framework. While it serves as a means of direction, the Guide also maintains a level of flexibility in order to allow for interesting and creative solutions.

## Vision and Goals

The goal of the planning guidelines and standards for Ames Research Center is to provide a meaningful guidance and helpful standards for development.

The specific goal will foster the following objectives:

- Encourage orderly and controlled growth at Moffett Field to meet the needs of NASA and current and future federal resident partners.
- Provide a safe and attractive place to work and live.
- Promote compatible uses of land, both within Moffett Field and between Moffett Field and the

surrounding community.

- Provide workable relationships between land uses and the transportation system.
- Provide desired levels of population density and intensity of land use.
- Facilitate adequate levels of utilities and community services.
- Protect wetlands and important biological resources.
- Conserve energy and land resources.
- Implement sustainable design strategies.
- Keep pollution at or below regulated levels.





# LAND USE

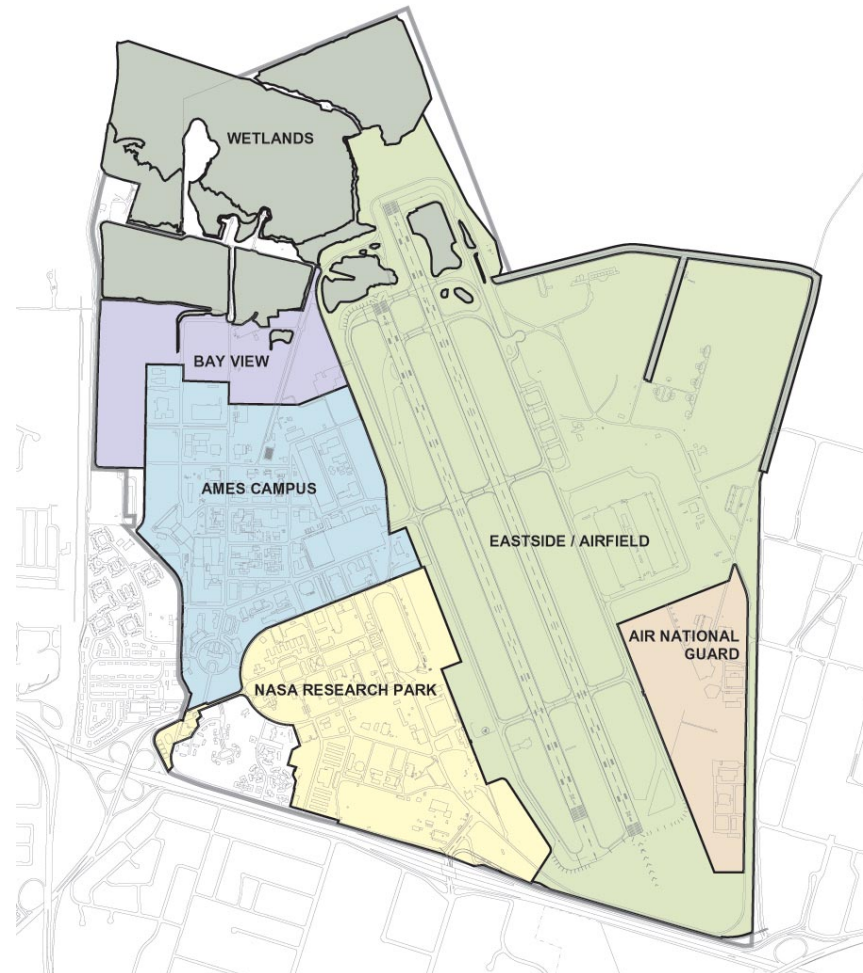
# NASA AMES RESEARCH CENTER LAND USE

## Overview

For planning purposes, Moffett Field has been divided into several smaller areas or districts, each with their own identity and function. The idea of expressing separate districts is a way to organize the Center's large, diverse environment into a set of smaller parts that are coherent and manageable.

Separate district identities add visual interest to the Center's overall environment. As a practical matter, existing functions, site conditions and building types are similar within each district, making it more reasonable to develop architectural and urban design guidelines specifically addressed to the challenges and needs of each.

Moffett Field's districts are identified and discussed as the following.



*NASA Ames Development Plan divided by districts.*

## NASA Ames Campus

Consisting of 240 acres situated west of the Moffett Federal Airfield runways, the Ames Campus make up the physical heart of the new expanded Ames Research Center.

Ames Campus is among the most active research and development centers in the United States and incorporates important and unique research facilities such as wind tunnels, flight simulators, numerous test facilities, and advanced computing systems. NASA has designated Ames Campus as the Lead Center for both Astrobiology and Aviation Operations Systems. ARC also serves as NASA's Center for Excellence for Information Technology.

## Bay View

The Bay View site is a 94.5-acre parcel bordered by the Wetlands to the north, Eastside/Airfield to the east, Ames Campus to the south, and Stevens Creek to the west. Planning for this area includes a mixed density housing community.

## Eastside/Airfield

The airfield, its support areas and the California Air National Guard Sub-area that make up the Eastside/Airfield comprise approximately 952 acres of the total 2,000-acre NASA Ames Research Center. The airfield is oriented on a northwest to southeast axis based on prevailing wind patterns and lies almost directly in the center of Ames Research Center. The runway spans from the wetlands and the Cargill salt ponds in the north to Highway 101 in the south. The airfield is used primarily by NASA, the California Air National Guard (which occupies the two largest structures within this planning area, Hangars 47 and 48), and the air operations of other resident agencies. The airfield is essential to NASA's continuing aerospace research and development activities.

## NASA Research Park

The NASA Research Park sits on approximately 213 acres of land bordered by the Eastside/Airfield, the Ames Campus Facilities, Military Housing, and Highway 101. This area, the focus of these

guidelines, will contain a variety of uses that can be separated into the following categories:

### ***Office***

Facilities in the Office Use zone shall be general office buildings and associated support functions including parking and limited retail.

### ***Research and Development (R&D)***

This zone shall be for research and development and associated support functions, including office areas, laboratories, high-bay space, parking and limited retail.

### ***Public Facilities***

This zone includes public oriented facilities, such as museums, conference centers, exhibit halls, and associated support functions such as parking and limited retail.

### ***Educational***

Facilities in this zone shall be dedicated to educational activities and may have a variety of

facilities types or functions, including classrooms, lecture halls/auditoriums, and laboratories, provided that the function of these areas is to support educational activities. Associated support functions include office areas, parking and limited retail.

**Historic District**

This area, commonly referred to as Shenandoah Plaza, was the original nucleus of the Moffett Naval Air Station as built in 1933. It stretches from Clark Road to Hangar One, defined by Wescoat and Bushnell Roads on the north and south, and also includes Hangars 2 and 3 in the Eastside/Airfield. The Historic District of the site may have commercial, research and development, public, and educational facilities. However, differing development guidelines will apply to all projects within the historic district, including renovation of existing facilities and new construction. See the Historic Resources Protection Plan (HRPP) for additional information.



- Legend
- |   |   |   |                      |
|---|---|---|----------------------|
| 1 | Office Space / Research and Development | 6 | Partner Parcel (TBD) |
| 2 | Public Facilities                       | 7 | Light Rail           |
| 3 | Educational                             | 8 | Open Space           |
| 4 | Historic District                       | 9 | Owl Preserve         |
| 5 | Mixed Use                               |   |                      |

NASA Research Park: Land Use Map



**Mixed Use**

Although primarily made up of mixed-use buildings, the Town Center and parts of McCord will be surrounded by ground floor retail space. This may include bookstores, cafes, public galleries, or lecture hall lobbies.

**Partner Parcel**

These undesignated areas will be used by any variety of partners, including office, R&D, educational, retail, and parking.

**Light Rail**

The point of departure and entry for those visitors using public transportation, the light rail station promises to be a major multi-modal point. The station will include vehicle park and ride, bicycle storage, shuttle, local bus, and pedestrian facilities.

**Open Space**

Facilities in the open space areas will be highly restricted and may only support the open space area. These facilities could include bus shelters and

public restrooms. Parking is not allowed within these areas.

**Owl Preserve**

This large area of 21 acres is located between the airfield and lands east of Cody Road and the Ellis Street extension. The Preserve contains Burrowing Owl habitat, and is considered a valuable resource worthy of protection. Because of the fragile nature of these creatures and their environment, pedestrian access through this area is prohibited.



# S I T E   D E S I G N

# OPEN SPACE CONCEPT

## Public Open Space

The NASA Research Park open space system creates a linked system of parks, plazas, gardens, and pathways providing a variety of public amenities and spaces for passive and active recreation that are appropriate in their location and respond to adjacent uses.

The open space system is reinforced by its visual and physical connections to features and activities within the NASA Research Park. The system ties into the publicly accessible open space within the university campus, and integrates into the adjacent and surrounding cityscape. Existing and proposed bicycle and pedestrian pathways will connect the NASA Research Park area and the proposed street system with adjacent uses, surrounding neighborhoods, and the citywide network of bicycle and pedestrian routes.

It is anticipated that the NASA Research Park's open spaces will serve a wide range of constituents with a variety of active and passive uses. Open spaces will be designed to include essential accessory



*Open Space Network: Conceptual diagram of “green” connections among parcels.*

facilities, where appropriate, including bicycle parking areas and adequate lighting.

***Burrowing Owl Habitat and Preserve***

This 21acre area is located between the airfield and lands east of Cody Road and the Ellis Street extension. Vehicles and pedestrians entering the NASA Research Park from Ellis Street will be centered on long views of the Preserve and the airfield. The Preserve contains Burrowing Owl habitat, and is considered a valuable resource worthy of protection. To ensure the protection of this species of special concern, NASA will prepare a Burrowing Owl Management Plan that sets forth standards and processes for protecting Burrowing Owls and fostering their continued presence at the Park. The plan will cooperate with qualified organizations to provide opportunities for public interpretation of this species of special concern. Limited access trails are proposed adjacent to the Preserve. Native grasses and other species indigenous to the owl habitat will be maintained as appropriate. Trees and other tall objects that would provide perches for owl predators shall not be

placed adjacent to Burrowing Owl Habitat.

***Perimeter Open Space***

A heavy buffer of trees and shrubs currently exists along the frontage of US 101. This landscaped zone shall remain where feasible or shall be replaced with suitable California native tree species where disturbance occurs from new construction.

***Special Landscape Linkages***

Where specific sidewalks form essential linkages between and along public open space areas, consideration should be given to special landscape treatment to encourage use of these sidewalks. This might involve tree selection, additional plantings or special paving, and should be considered for linkages along Ellis Street Extension from the Highway 101 underpass to the Town Center, McCord Avenue Extension from the Town Center to Wescoat Road, and along Cody Road from Ellis Street Extension to Hangar One.



## Commercial/Institutional Open Space

The following guidelines refer to such uses as office, research and development, general commercial, institutional and retail uses. It is anticipated that these commercial uses will complement the planned laboratory facility and other existing uses on the NASA campus. The guidelines encourage an active and visually interesting pedestrian environment, building placement and character that will give the commercial areas a distinctive identity.

## Block Development

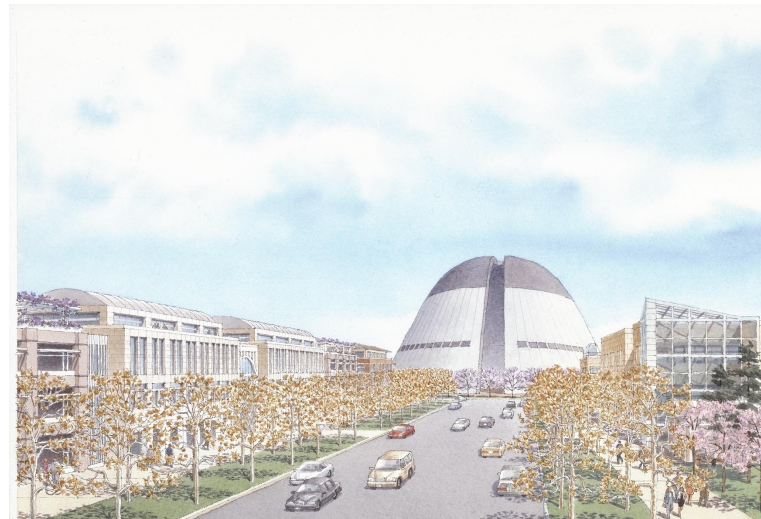
### ***View Corridors***

The NASA Research Park street grid system defines view corridors. No building, or portion thereof, shall block a view corridor established by the street grid system and dedicated right-of-ways.

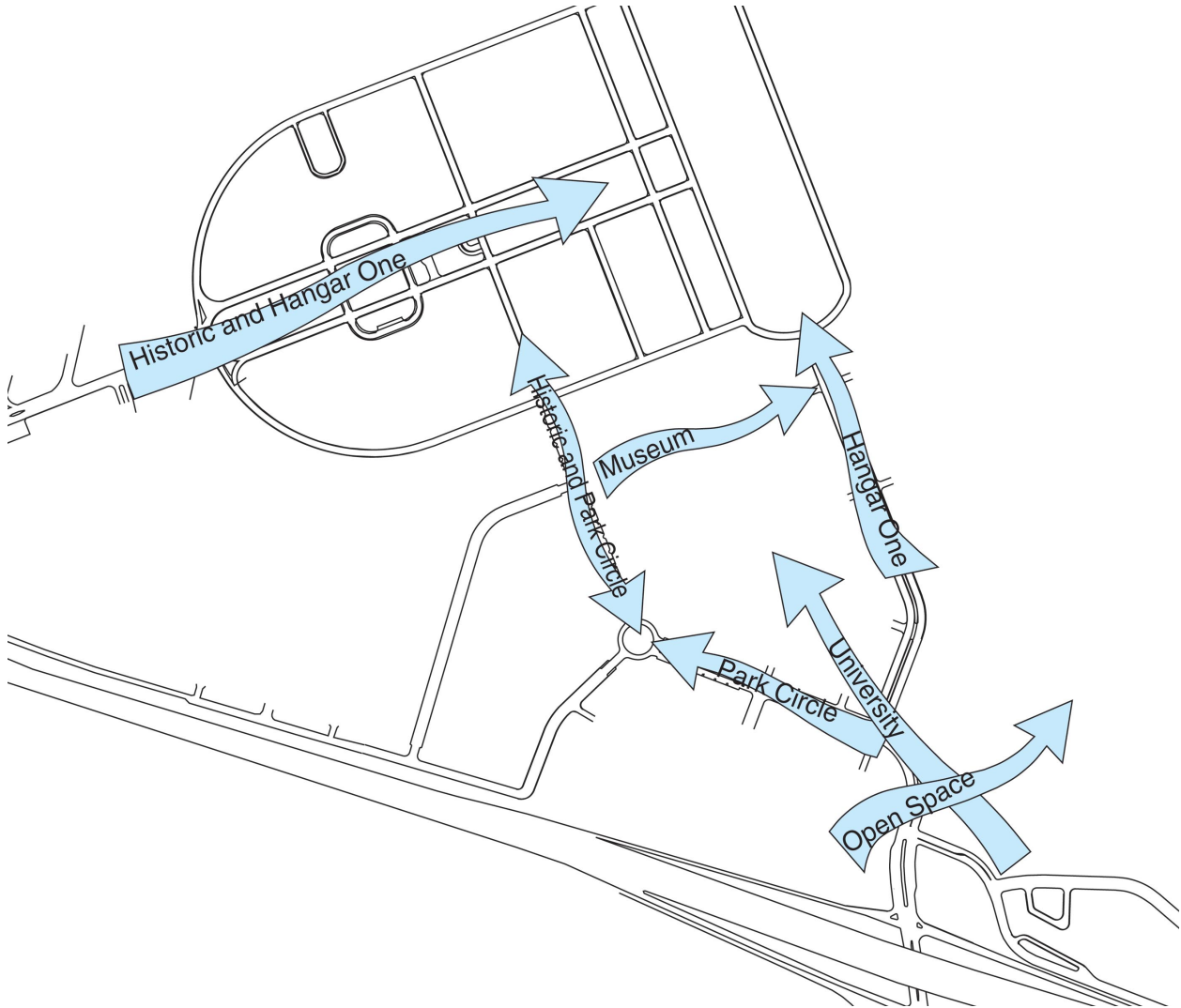
- The view corridors serve primarily to retain views to the existing Shenandoah Plaza, the Town Center, views to Hangar One, and to reinforce visual linkages between the University Partner's



*View looking towards Laboratory Project*



*View looking toward Hangar One*



View Corridors

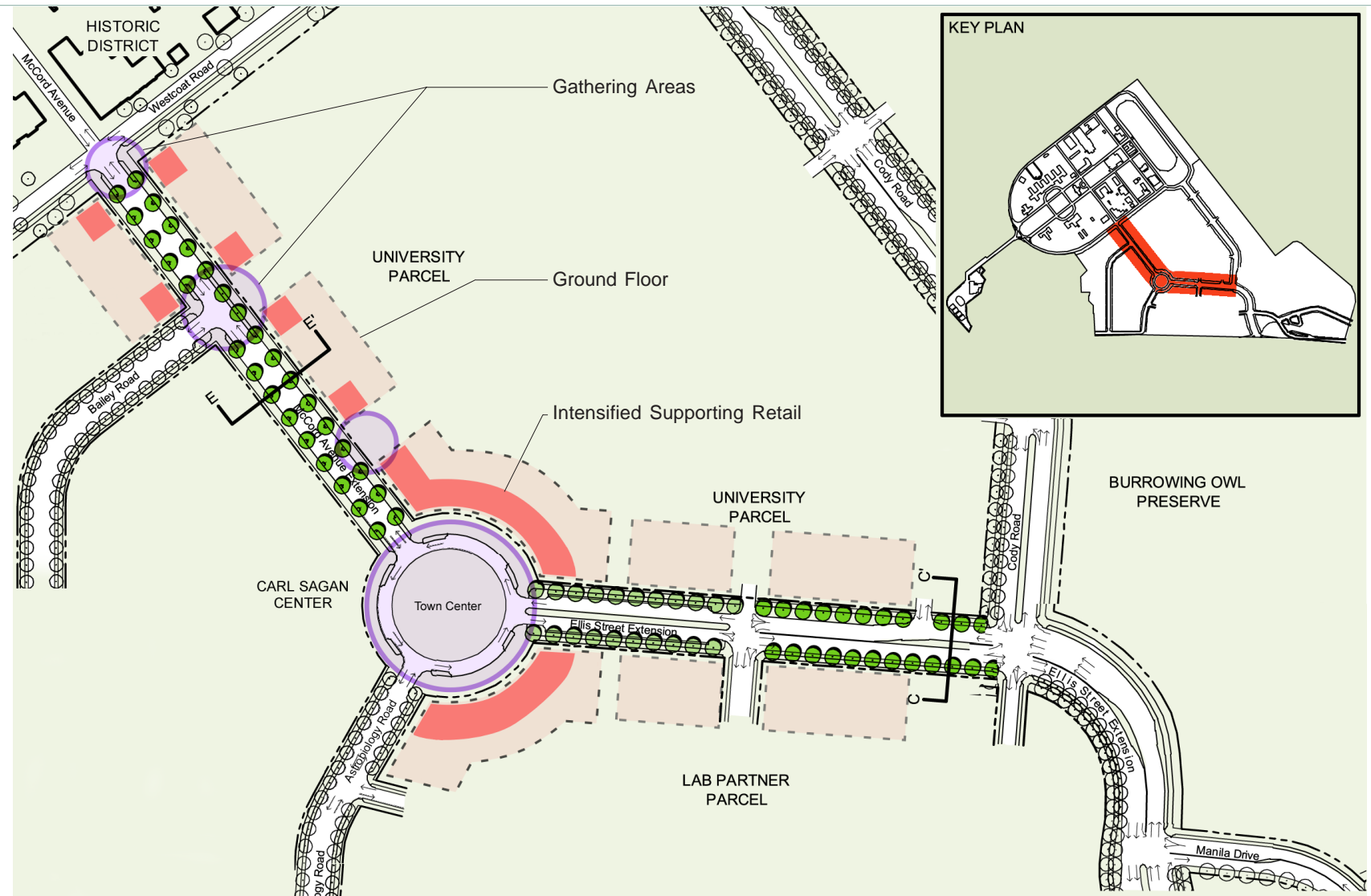
campus and the surrounding development.

- View corridors may also terminate to buildings rather than vistas. Two examples of this are the termination of Ellis Street Extension at the Town Center, ending visually with the laboratory building, and the termination of Cody Road ending visually with Hangar One. These visual termination points are important architectural opportunities and should be designed in a matter that reflects their importance.
- A view corridor between the light rail station and foot of the university parcel or to within the university parcel will facilitate pedestrian access between the two as well as shorten the perceived distance between them.

### Open Spaces

The development of publicly accessible open spaces at ground level is encouraged at the Town Center and along McCord Avenue. Where feasible, design these open spaces for intensified retail uses such as cafes, bookstore, etc. as well as in relation to the public open space network. This ensures the development of several gathering areas for the community.

- Public right-of-ways in the commercial / institutional area that are not needed for vehicular access should be designed as dedicated open spaces with pedestrian uses.



Ground Floor Open Space Diagram: Where possible, retail spaces shall be concentrated along open spaces between buildings.

***Pedestrian Environments***

Personal encounters within the NASA Research Park can stimulate the flow of information and exchange of ideas that cannot otherwise occur within the vehicular or built environment. The intent of open spaces is to encourage the development of comfortable, attractive pedestrian spaces and circulation pathways that are also efficient and safe.

- Walkways to mid-block open spaces or courtyards are encouraged.
- Within the large blocks as defined by the NASA Ames Development Plan (NADP), and along Highway 101, mid-block pedestrian and/or service-only or parking access lanes are encouraged to provide needed access and reduce the scale of these large blocks.
- Pedestrian pathways should be planned to create a coherent, accessible, safe, and connected campus-wide system of pedestrian movement.
- The system of pathways and open spaces will create a pedestrian oriented system distinctly separate from vehicular and service circulation

zones.

- Sidewalks will accommodate pedestrians on both sides of all campus streets.
- Pedestrian pathways will link major activity areas and surrounding open space. Portions of pedestrian pathways may be designated for bicycle use.
- Open spaces and plazas should be strategically placed at or near pedestrian pathway intersections to promote interaction and collaboration.



# PLAZA CONCEPT

## Introduction

Creation of strong, imageable spaces that define the public realm and create a unique environment is the most important goal of these guidelines. Unlike many of the corporate office campuses in Silicon Valley, the NASA Research Park will be a campus with a strong open space system, similar in grandeur to the Historic District.

There are both formal and informal open spaces at the NASA Research Park. The latter include spaces such as the Burrowing Owl Habitat and Preserve while the former includes locations such as the Town Center, Transit Green, Hangar One Plaza, and the interior of the University campus. The following guidelines and diagrams are provided for the development of these places.



*An artist's illustration of the future NASA Research Park.*



# Goals

## General

- Create an environment that allows for formal gathering spaces and ceremonial places.
- All buildings and public open spaces should be connected via pedestrian walkways.

## Town Center

Develop the Town Center as a focal point of activity and as a meeting ground between the Carl Sagan Center, Lab Partner parcels and the University parcels.

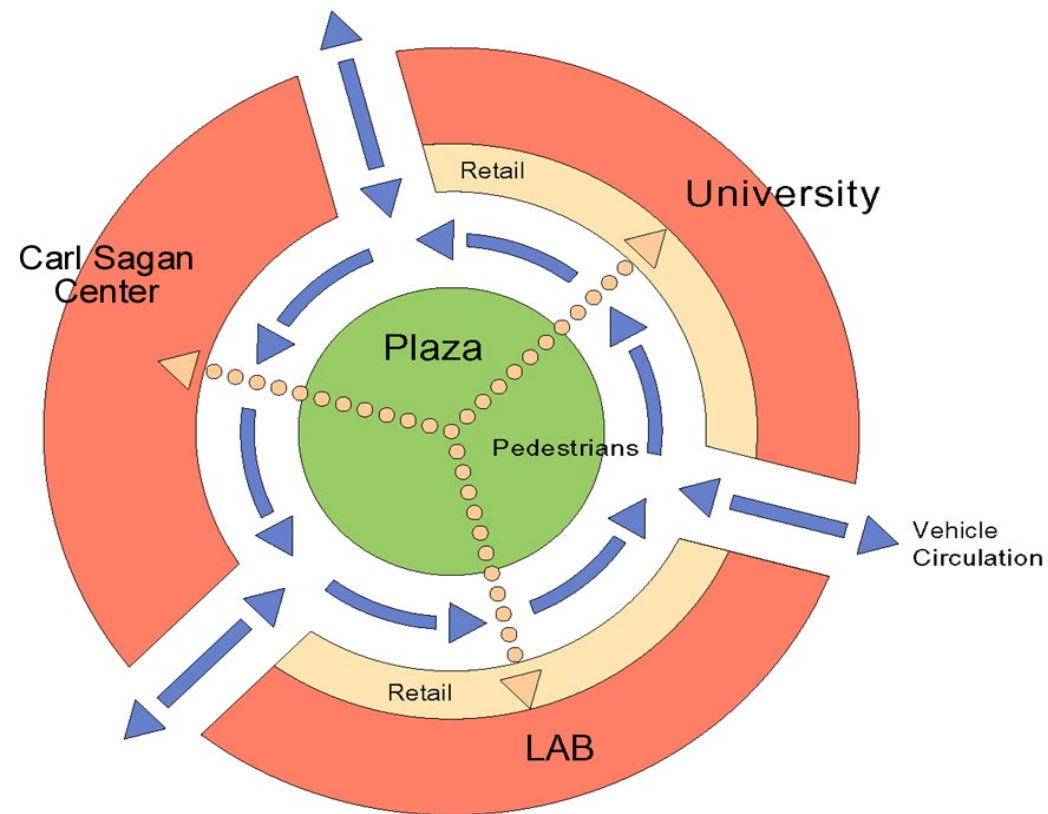
- Reinforce views to the Carl Sagan Center located at the western edge of the Town Center on axis with Ellis Street Extension.
- Encourage diversity in activities and respond to surrounding land uses while providing an overall unified character.
- Develop the Town Center as an inviting urban open space. Maintain design continuity and spatial definition along the circumference using hardy vegetation and durable hardscape

materials and by maintaining a continuous pedestrian open space and built edge of appropriate scale and character along its perimeter.

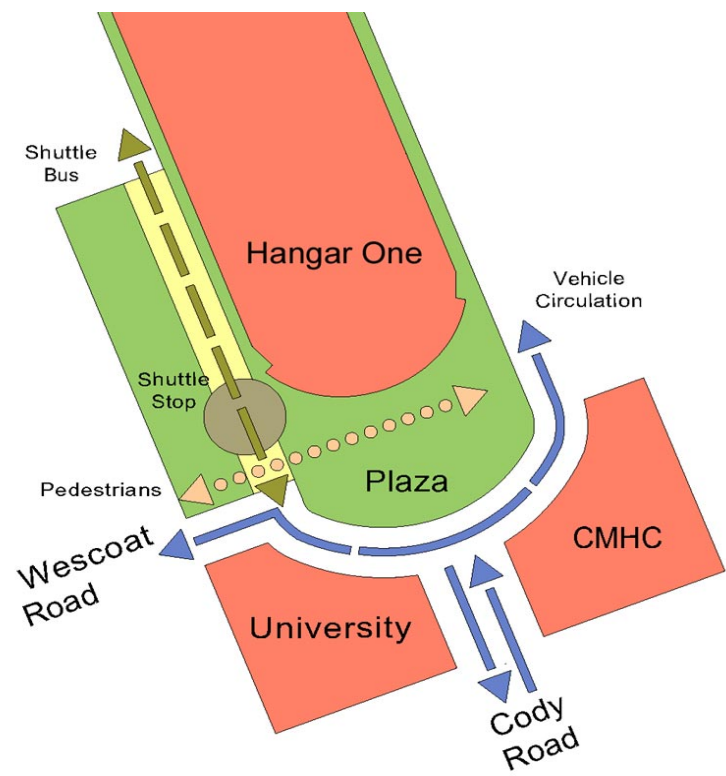
- Encourage retail development on the ground level of buildings fronting the Town Center (excluding the Carl Sagan Center). Integrate small accessory concessions in buildings fronting the Town Center as determined feasible and appropriate.
- Allow hardscape paved areas to accommodate a variety of uses.

### ***Town Center***

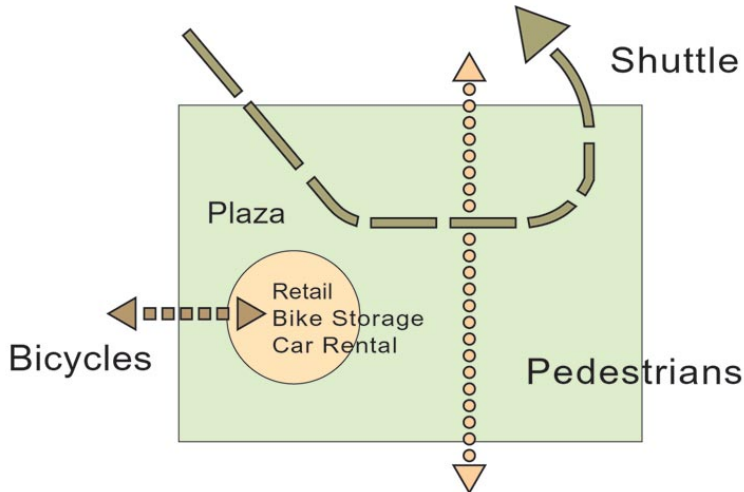
The ceremonial “heart” of the NASA Research Park is the Town Center, which is framed by the Carl Sagan Center and other University and lab partner signature buildings along the Ellis Street Extension and McCord Avenue Extension. The center of the circle will be an open plaza and may feature civic art or a prominent water feature. Each of the buildings fronting the Circle will be architecturally significant, and the University building(s) are expected to have ground floor retail space (e.g. bookstore, cafes, etc.). The Carl Sagan Center will front closer to the Circle and provide a greater presence due to its axial alignment to Ellis Street Extension and its significance to the NASA Research Park. Outdoor seating areas are encouraged to help increase the pedestrian nature of the plaza, and California native shade trees, special paving, and other higher quality landscape amenities will be featured.



*Town Center Plan: Diagram shows the general organization of the Center and the connections and movement that occur there.*



Hangar One Plaza Plan: Diagram of recommended shuttle stop within the context of the plaza.



Central Shuttle Stop at Hangar One

**Hangar One Plaza**

Hangar One is located at the northern end of Cody Road. A plaza is proposed on the southern end of the building in front of the large doors, which open into the facility, as well as along the western edge of the Hangar. Because of its large size, this space is ideally suited for large gathering events. The plaza also serves as a physical connection between the University partners, The Computer History Museum, and to the Hangar itself. As a result, a major transit stop for the Research Center's shuttle system is recommended here.

The central shuttle stop at Hangar One shall be designed as a part of the plaza concept combining landscaped areas with public transportation needs. Easy pedestrian access and recreation quality must be guaranteed. Covered bike storage areas must be provided within the plaza. Bike storage may be combined with commercial uses such as bike rentals or retail facilities.

**Transit Green**

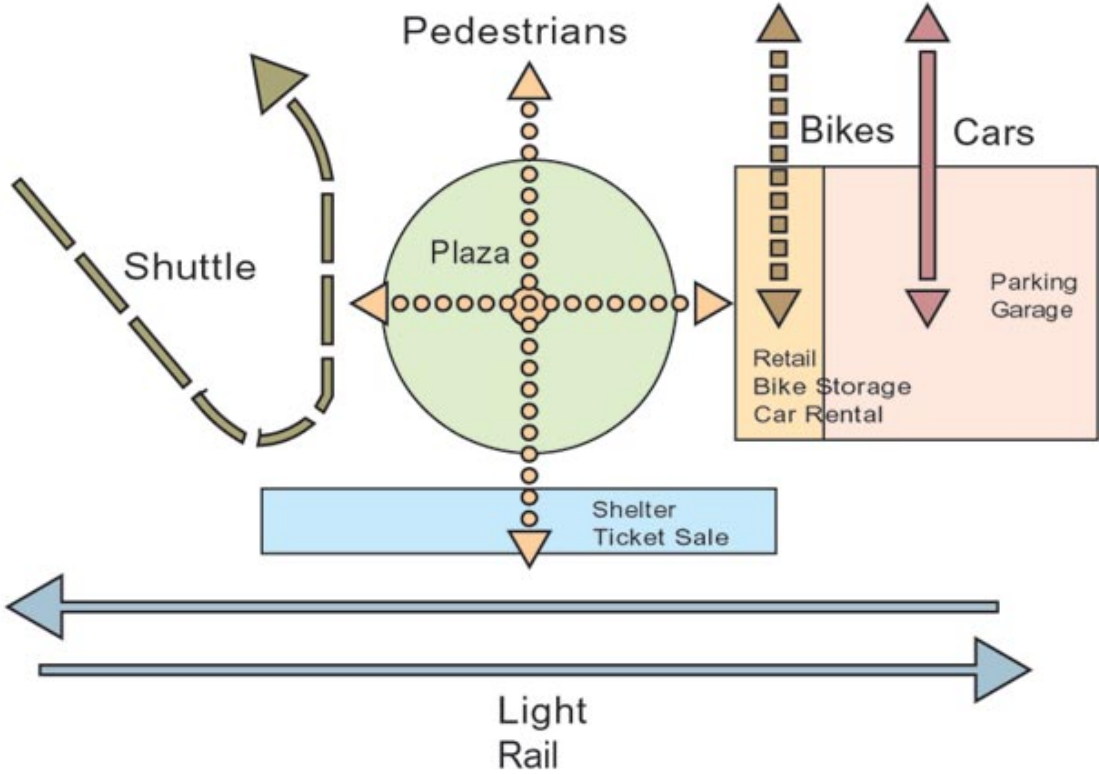
The purpose of the transit green is to provide an attractive setting for the new light rail station and the perimeter parking located in the southeast corner of the NASA Research Park. The green is oriented with the station as the terminus on the south end, and the Owl Preserve and distant views of the airfield to the north. This space should be minimally landscaped, allowing for passive, informal use of the space.

The light rail station shall be organized within two buildings containing the basic functions for traffic interchange (waiting areas, parking) and related uses (ticket sales). The landscaped plaza, the Transit Green, will provide quality outdoor areas for pedestrian circulation. Parking should be condensed to minimal space by providing a parking garage. As a result, access and traffic distances can be reduced and functionality will be maximized. Optimized pedestrian accessibility to the light rail plaza shall be granted. However, this central open space may be open to shuttle buses in order to access staging areas. Parking garage and/or light

rail station shall provide integrated bike storage areas and may be combined with additional commercial functions such as bike/car rental, newspaper stands, etc.

**University Campus Open Spaces**

In general, these open spaces will have a unique identity, but at the same time, reflect the overall vision of NASA's campus-like environment. While no specific recommendation is made as to the layout or design of those spaces, they should relate to the larger design vocabulary of the Park in their landscape palette and landscape amenities (e.g. lighting fixtures, benches, trash receptacles, etc.).



*Light Rail Station-Transit Green Plan: Diagram shows general organization of the transit station and the various activities that occur there.*

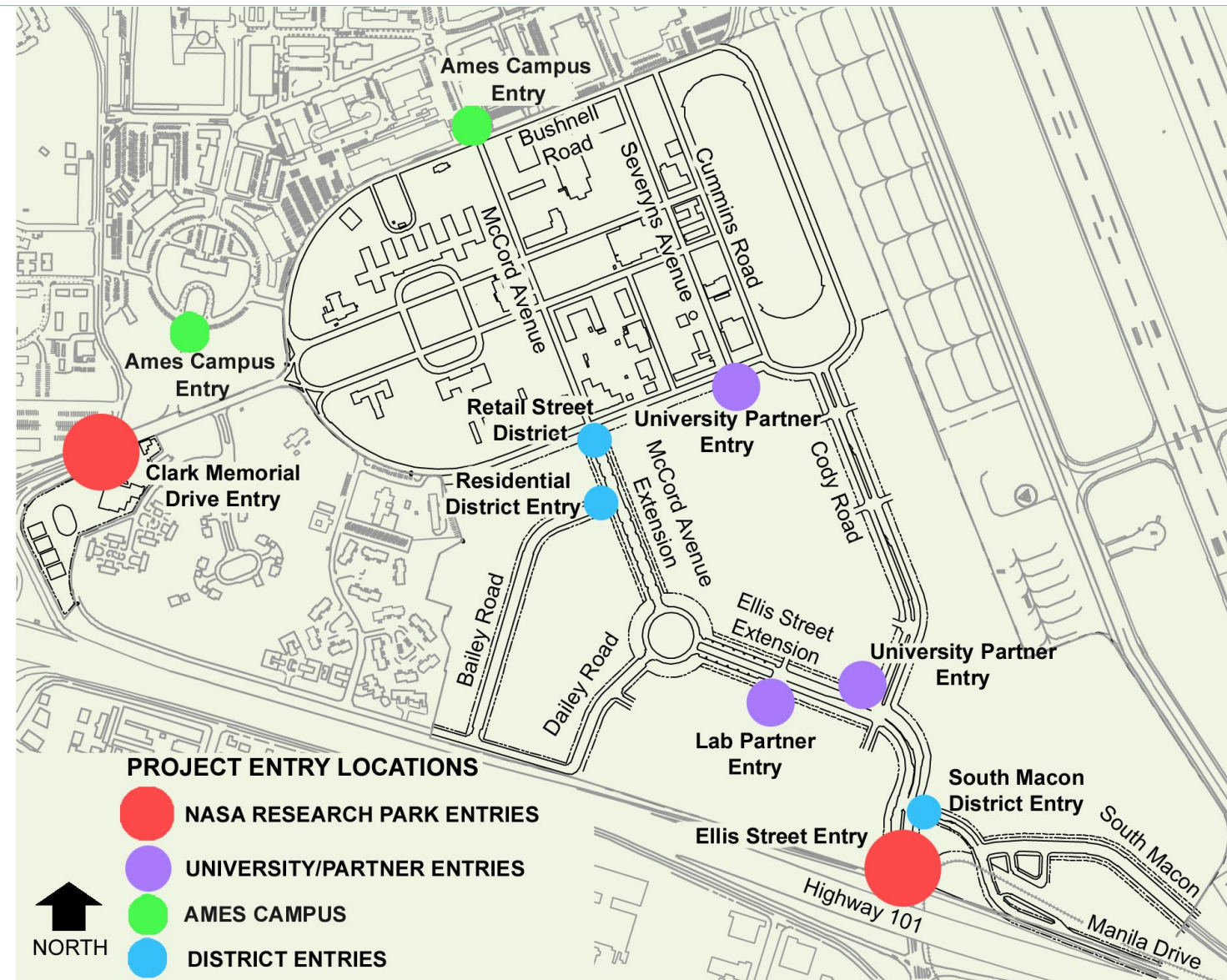


# SITE ENTRANCES

The NASA Research Park will be accessed from both Ellis Street to the south and the Historic District via the Clark Memorial Drive to the north. Minor gateways include McCord Avenue Extension, Severyns Avenue and Manila Drive. In general, there should be an understanding and recognition of the NASA Research Park, in context with the main Ames Campus and other developments in the Moffett Field area. In addition, there should be understandable recognition of the individual “places” or districts within the NASA Research Park. This identity can be achieved through monumentation, landscape treatment, and effective signage.

## Goals

- Develop a clear identity of the overall site when entering the NASA Research Park from outside its boundaries.
- Develop a common signage design vocabulary for identifying the various site users, but allow for individual expression of the University/ Partner parcels. However, all project entries shall incorporate a consistent design approach and establish a hierarchy of scale appropriate to





*Gateway monumentation, in combination with landscape features, like this fountain, are encouraged.*



*Entry signs should be placed near driveways and well integrated with the landscape.*

the importance of the entry. For example, the NRP entries should use larger more massive elements and District entries should use smaller, less obtrusive entry treatments.

- Develop a site signage program for wayfinding and building identification that is clear and legible to the motorist, bicyclist and pedestrian.
- All entry monuments and landscaping shall maintain safe sight distances for critical views of traffic and pedestrians at all intersections.

## NASA Research Park Entries

The Clark Memorial Drive entry and the Ellis Street Extension entry will provide the primary access to the NASA Research Park, and therefore should display the most prominent identities. Gateway monumentation, in combination with landscape walls and trees is suggested. These entries shall establish a visual transition from the freeway into the Research Park.

## University/Partner Entries

Access to the University and Partner parcels should be acknowledged through signage and entry monuments. These entry points should clearly direct and inform patrons to various institutions and facilities as appropriate. Although respecting the overall context of the Park, these entries should also reflect the character of each institution.

## Ames Campus Entries

The Ames Campus entries should be similar in material and scale to the University/Partner entries to acknowledge the existing facilities at the northern edge of the Historic District.

## District Entries

Least in scale, but utilizing similar materials, the District Entries will welcome visitors and patrons to (1) the retail shops on McCord Avenue Extension, (2) the residential district adjacent to Bailey Road, and (3) the South Macon transit center.

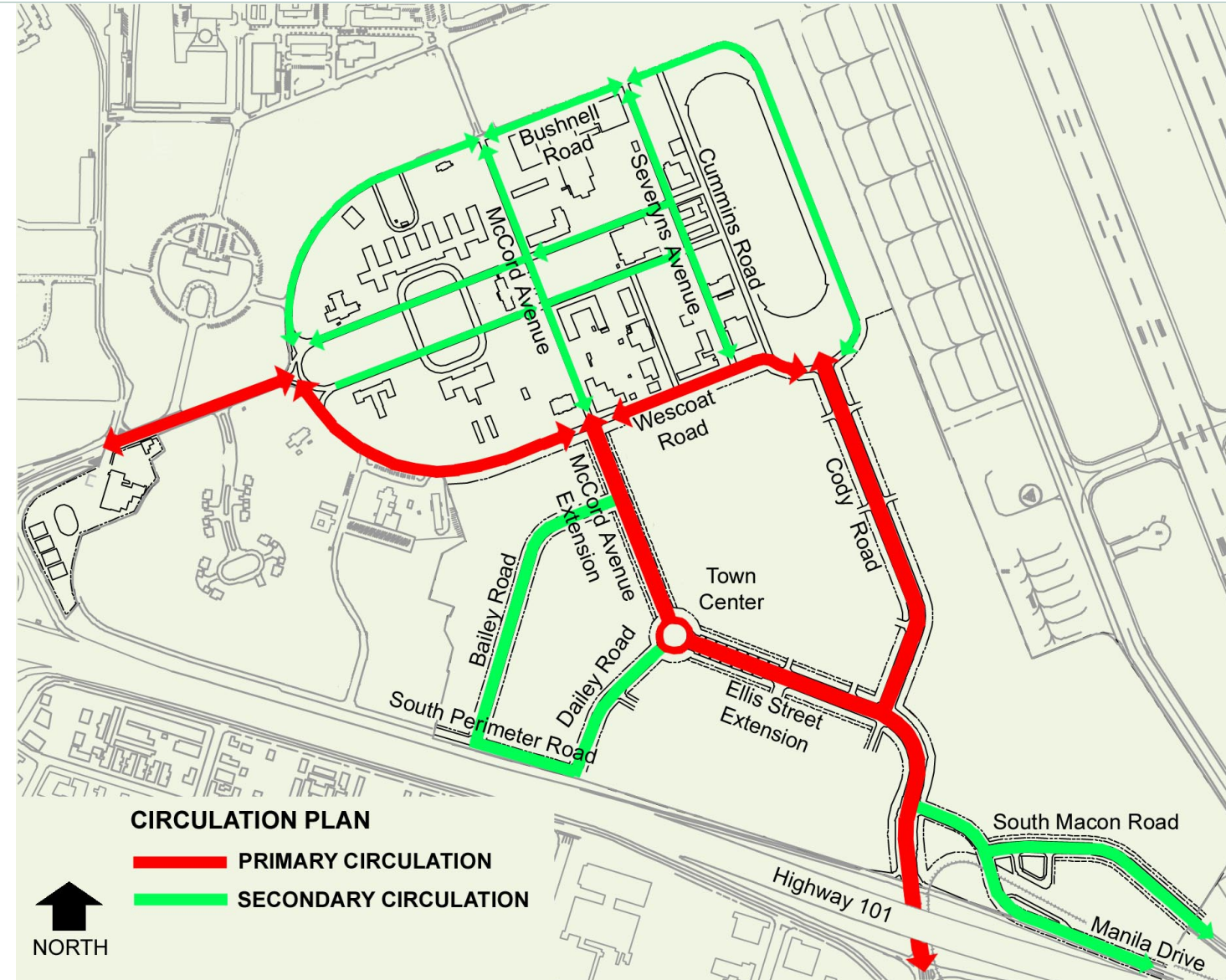


# CIRCULATION

## Introduction

The NASA Research Park campus will require a new circulation system to facilitate movement for vehicles, mass transit carriers (e.g. shuttle buses), bicycles, and pedestrians. The current road network from the Historic District southward is inadequate to serve the planned new development, and in fact, will have to be re-designed to accommodate the NASA Ames Development Plan. The intent of the revised circulation system is to minimize vehicular conflicts and maximize pedestrian and bicycle access amongst users and the main NASA complex as much as possible. Parking lots and parking garages will be located strategically to allow for easy recognition and to promote dispersal of traffic patterns. On-street parking will be allowed where appropriate to help minimize the overall parking demand and to intentionally slow traffic in areas of high pedestrian activity.

This section will discuss the overall framework for the circulation systems, with more detail provided in the Streetscape section of this Design Guide.





## Goals

- Develop a clear hierarchy in the roadway system that is easily recognizable, and allows for the orderly flow of traffic into and throughout the NASA Research Park.
- Minimize thru-traffic volumes between the Ellis and McCord Avenue Extensions (through the Town Center) and allow for on-street parking and mid-block crosswalks.
- Develop a shared parking concept where possible that encourages shared use of surface parking lots and parking structures between day and night users, weekday and weekend users, and users of different facilities.
- Integrate peripheral parking to reduce vehicles driving through the campus.
- Identify a route for mass transit vehicles (e.g. shuttles, busses, etc.) that can travel through the NASA Research Park and the campus to the light rail station.
- Create an environment that allows for pedestrian way finding, through the use of sidewalks, trails, and proper signage.

- Implement sustainable transportation design strategies with the following goals:
  - 1) Facilitate and encourage alternative transportation modes, with a particular emphasis on creating a pedestrian-friendly environment.
  - 2) Provide pedestrian and bicycle access to light rail, bus lines and Caltrain.
  - 3) Provide pedestrian and bicycle access to food vendors, shopping, banking; Provide a community infrastructure that reduces vehicle miles traveled, and number of car trips.
  - 4) Provide easily navigable bike paths and lanes to encourage the use of bicycles on the campus; provide convenient bike parking for bicycle commuters.
  - 5) Provide priority parking spaces for carpools.
  - 6) Utilize parking decks (Reduce land clearing and storm water runoff).
  - 7) Utilize separate parking structures at some distance from the building.
  - 8) Provide satellite parking.

## Vehicular Circulation

There are two primary entrances into the NASA Research Park- one via Clark Memorial Drive to the north and the other via the Ellis Street Extension entrance with direct access from US 101. Through directional signage located along the Ellis Street Extension, vehicles will be directed to parking locations on the periphery of the campus. Traffic destined for the main NASA Ames Campus or other NRP sites will use Cody Road, a major roadway that connects to Hangar One. Cody Road will be designed to accommodate large volumes of visitor traffic for air shows and site thru-traffic. Visitors destined for the Town Center and the Carl Sagan Center or the McCord Avenue retail street will continue along the Ellis Street Extension. The NASA Research Park can also be accessed from the Historic District (Wescoat Road, McCord Avenue, and Cummins Road) and via the Moffett Field exits from US 101.

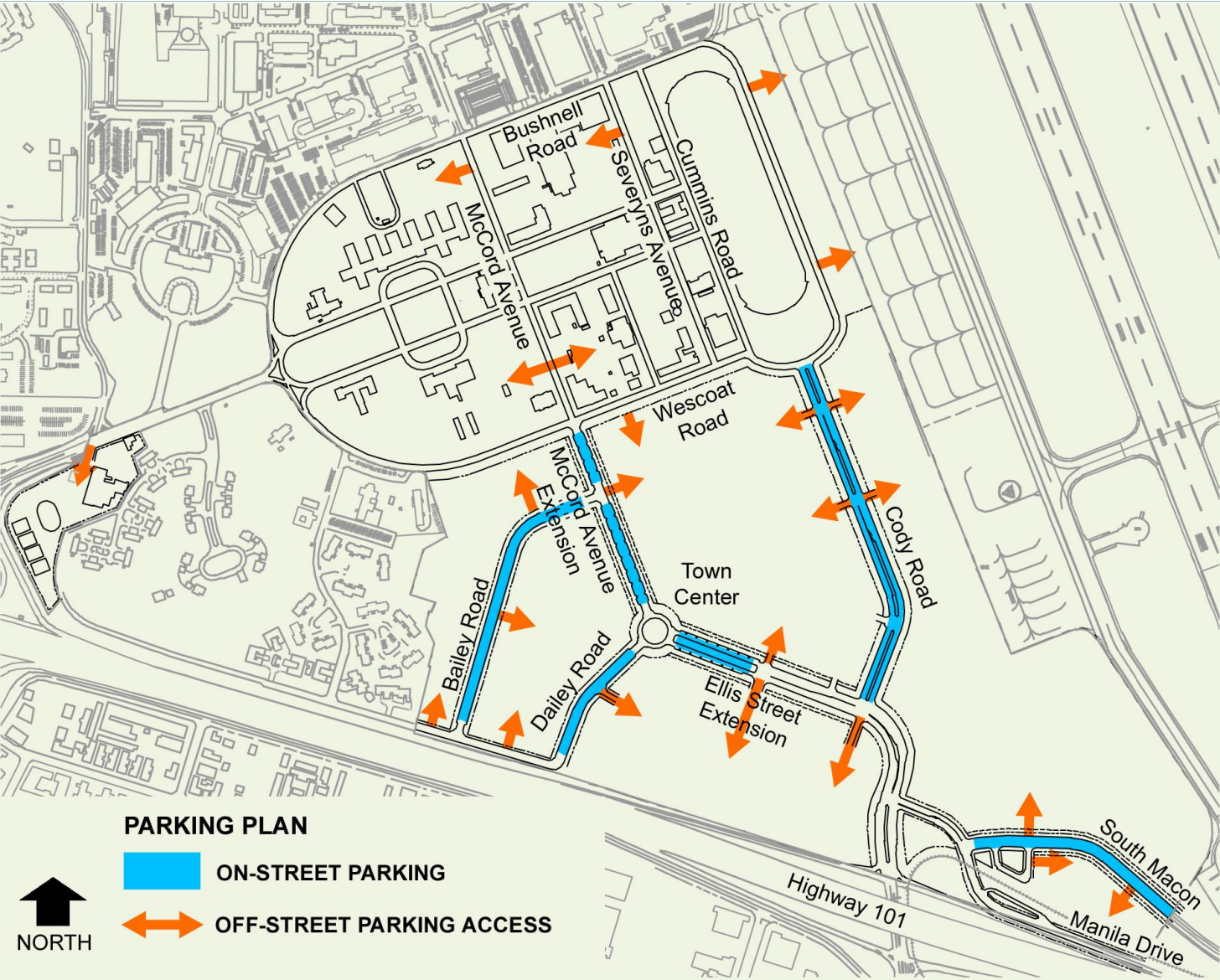
Additional main roadways within the NASA Research Park include the north/south link (Bailey Road)

between the existing South Perimeter Road and the McCord Avenue Extension and a smaller link between the Town Center and the South Perimeter Road (Dailey Road). Both of these roads will serve traffic to the potential housing areas adjacent to the Historic District and the Carl Sagan Center. The existing access road from the light rail station southeast to Moffett Park in Sunnyvale will remain (Manila Drive) with some realignment and widening as appropriate. A secondary roadway (South Macon Road) will be required to access development parcels adjacent to the habitat preservation area and the recently completed light rail station.

Smaller roadway Right-of-Ways (ROWs) may be required within the University/Partner zone to allow for access to parking garages and service from Cody Road, Ellis Street Extension, and McCord Avenue Extension.

Parking Plan

Due to the proposed densities included in the NASA Ames Development Plan, parking will require a



mixture of surface and structured garages to handle the demand. Based on the site uses and site goals, the Transportation Demand Management (TDM) plan will determine the number of parking spaces required on-site. However, the Plan anticipates a very active TDM Program to minimize vehicular trips.

Parking lots and garages will be located for easy access from the Ellis Street Extension, Cody Road, Wescoat Road, South Macon Road, and the South Perimeter Road. Additionally, parking is planned adjacent to the light rail station to reduce on-site traffic congestion and enhance the bicycle and pedestrian experience. In general, the University campuses will require parking structures in order to maintain a quality open space environment, with access from Cody Road and Wescoat Road/Bailey Road. Building sites outside of the University campus core will access their parcels from the Ellis Street Extension, Bailey Road, Dailey Road, Manila Drive and South Macon Road. The lab partner located south of the Ellis Street Extension will require a combination of parking structures and surface parking lots. This site will also have the

benefit of easy access to the northbound on-ramp of US 101 (via a dedicated outbound right-turn lane on Ellis Street Extension that will start at the intersection with Manila Drive).

On-street parallel parking will be permitted along the Ellis Street Extension for approximately 350 feet east of the Town Center; McCord Avenue Extension; Bailey Road; Dailey Road; South Macon Drive; and around the Transit Green. The Parking Plan figure depicts the general location and type of parking that will occur on and off the street.

### Shuttle Plan

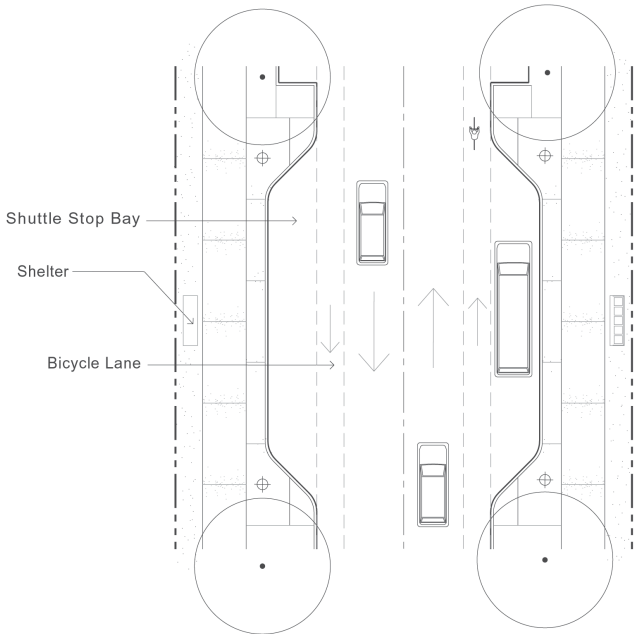
The Santa Clara Valley Transportation Authority (SCVTA) recently completed the new Bayshore/NASA Ames light rail station on the Tasman Line, which connects Mountain View and Sunnyvale to Santa Clara, San Jose and Milpitas. Although the station is located in the southeast corner of the NASA Research Park and not in the center, it will indeed offer an alternative mode of transportation to thousands of workers and students in the future. In

order to promote use of the light rail, an on-site shuttle system will be implemented with 10-minute headways throughout most of the day. The goal is that all employees and students will be able to reach their destination within minutes.

The shuttle system will include several routes. The shuttle system would connect the NRP, the Conference and Training Center, NASA Ames Campus and the housing and parking locations at Bay View. Bi-directional service along the Ellis Street extension, McCord Avenue, through the historic district, and along the frontage road will provide frequent, direct service to Bay View residents. A separate shuttle would serve Ames Campus' needs beyond the fenceline. Caltrain Connector will meet all Caltrains and bring passengers to Ames Research Center. This shuttle would also provide mid-day service to downtown Mountain View. For more specific descriptions and guidelines concerning the shuttle system, see the *Transportation Demand Management Plan*.

**Bus/Shuttle Stops**

Shuttle stops will be located at several key locations scattered throughout the site. Shuttle or bus turnouts should be designed as an integral component of the street ROW. Separate bays for shuttle bus stops shall be provided in streets to minimize impact to traffic and increase security of passengers getting on and off buses. Bus bays shall be provided between street/bicycle path and curb and be directly accessible from pedestrian walkways. Shelters that also provide a small amount of seating and other essential amenities will be provided.

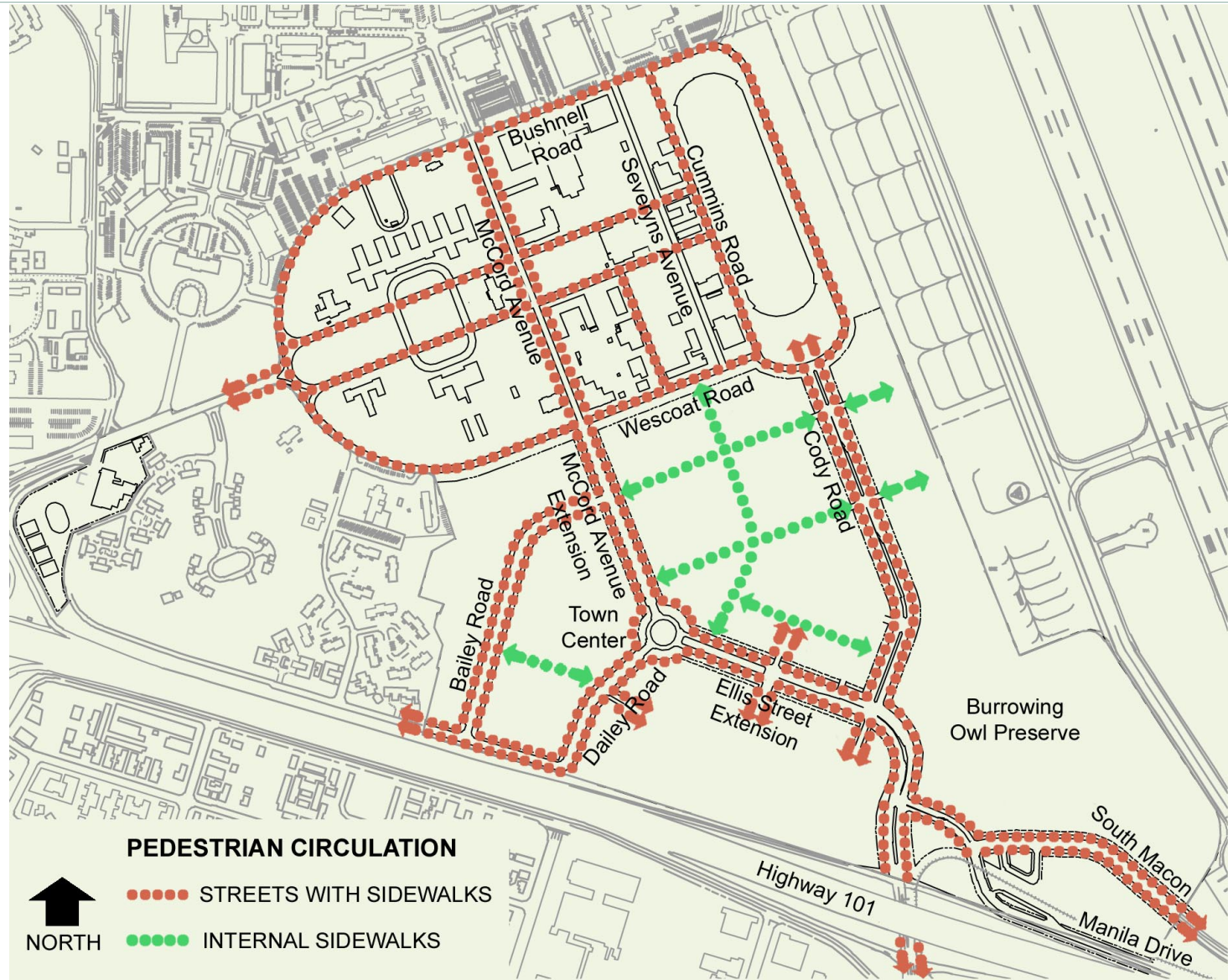


*Shuttle stop design: Typical on a 2-lane street.*



*City of Mountain View Transit Station, Mountain View, CA  
Bus/shuttle stops, shelters, turnarounds, and related activities shall be integrated into a coherent design.*





## Pedestrian Circulation Plan

The site has been organized to promote and encourage pedestrian use between facilities that are related (e.g. University buildings) and other desirable locations within the NRP (e.g. to the Transit Green, parking structures, retail uses and the Historic District and Ames Campus). All streets include tree-lined sidewalks and the University partners are encouraged to connect their facilities to the Town Center with all-weather pedestrian and bicycle paths. Pedestrian paths transecting the Burrowing Owl Preserve are avoided; however sidewalks adjacent South Macon, Ellis Street Extension, and Cody Road will provide access around the preserve. Major intersections will be controlled with traffic signals or stop signs and pedestrian crosswalks will be clearly delineated.

## Bicycle Circulation and Parking

All streets within the NASA Research Park will be provided with Class II bicycle lanes, promoting bicycle use on site as much as possible. Particular emphasis is important in connecting the Transit Green to the University parcels and the Ames Campus beyond. To encourage the use of bicycles on-site, adequate bike racks and shelters should be provided at key places within the public ROW such as the Transit Green and Town Center, and also within the University and other lab partner parcels (see *Lighting and Site Furnishings Chapter*).

Bicycle parking must be provided along the “desire line” between major bicycle routes and building front doors. That is, bicycle parking should either be placed adjacent to building front doors or it should be placed on a natural path toward the front door. However, bicycle parking shall not block any access to buildings nor streets or pedestrian ways. Where possible, long-term parking should also be protected from rain. If the parking is not secured in

the form of corrals, it should be placed within sight of building windows, allowing for informal surveillance.

Possible locations of bicycle parking in relation to individual buildings include:

- Setback areas at sides of entrances
- Courtyards
- Under elevated building elements
- In separate “architectural elements” such as storage buildings

Bicycle parking in public spaces can be organized in:

- Landscaped areas between street and plazas or parks
- Landscaped zones between pedestrian walk and curb
- Parking bays between bicycle path and curb



Stanford University, CA  
*Bicycle cage design and placement example.*



Palo Alto, CA  
*Different rack styles meet bike rack guidelines (see TDM for specific information)*





*Stanford University, CA  
Bicycle parking should be located along “desire line.”*



*Stanford University, CA  
Convenient bicycle parking that is  
near building entrance and covered.*



*Palo Alto Shopping Center, CA  
Bicycle parking in landscaped area between  
pedestrian walkway and street curb.*

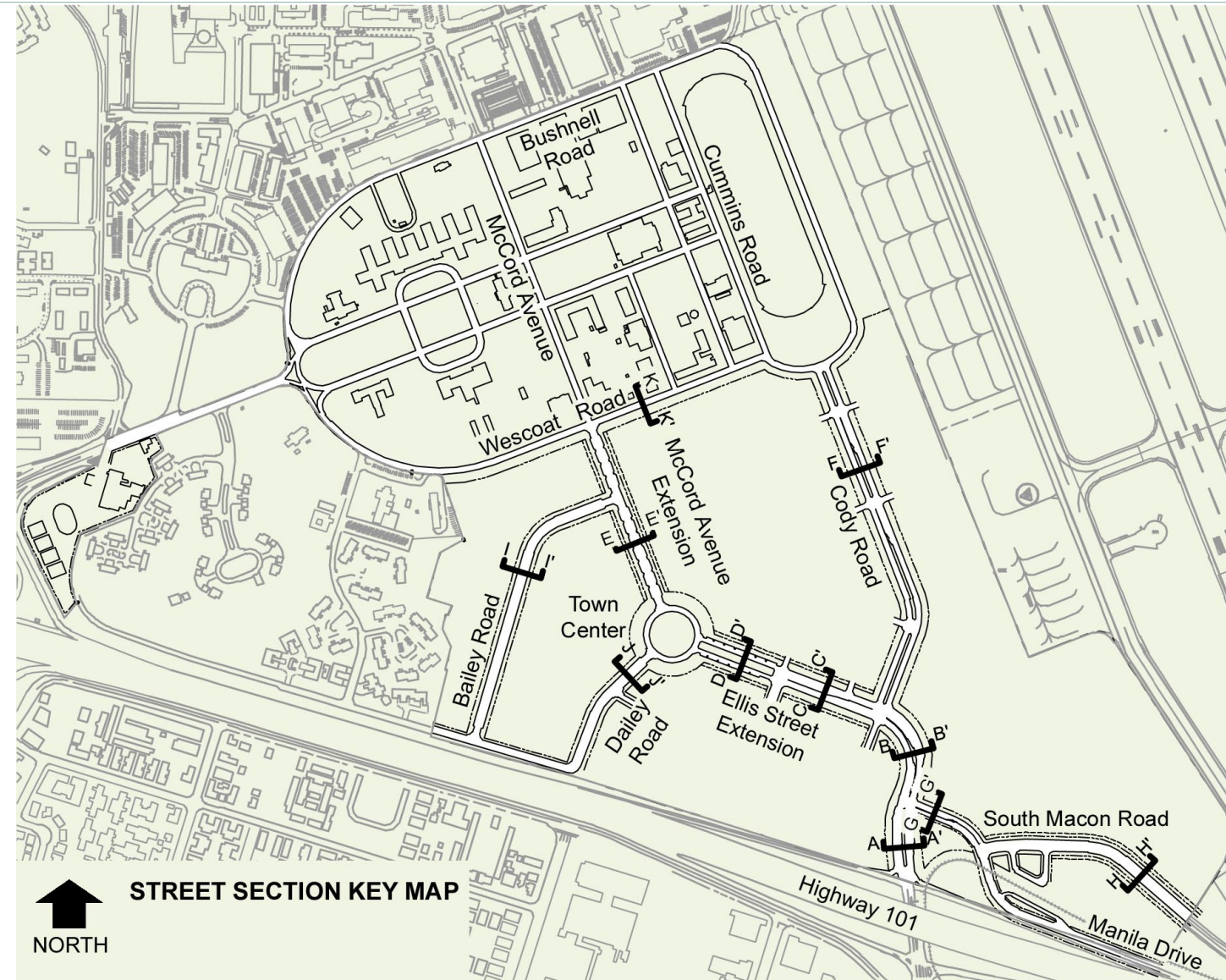


*Palo Alto, CA  
Well-placed racks on a commercial street.*

# STREETSCAPE

## Introduction

The street Right-of Ways (ROW) at the NASA Research Park are designed to accommodate expected traffic flows based on the TDM and provide a pleasant environment for bicyclists and pedestrians. This section illustrates the expected cross-sections of each major street within the NASA Research Park and graphically depicts the number of lanes and landscape/sidewalk treatments and building setbacks. In addition, it calls out the types of lighting fixtures and site furnishings appropriate for each area. See *Lighting and Site Furnishings* and *Hardscape Materials* for definitions of these types.





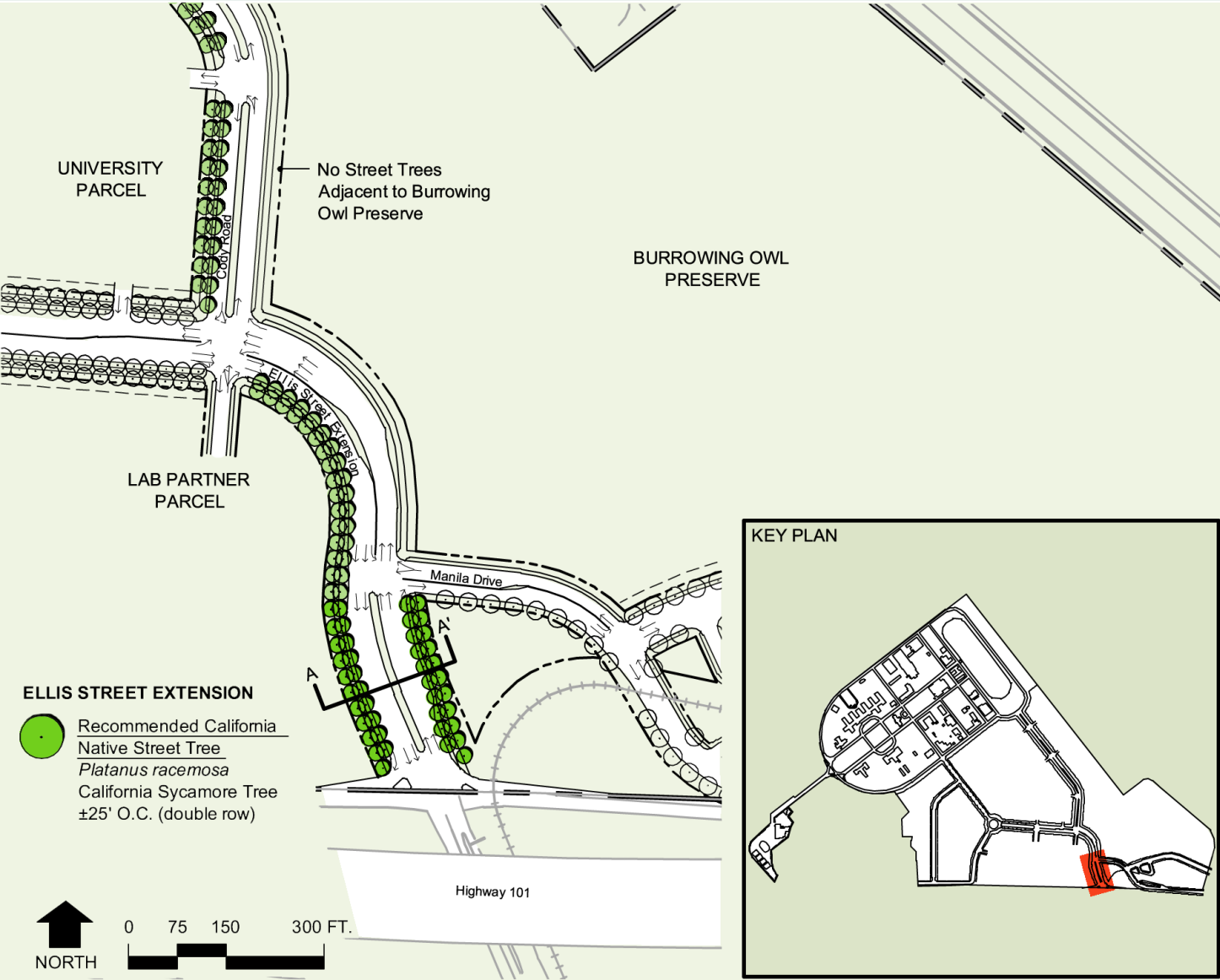
## Goals

- Provide for pedestrian sidewalks on all streets and provide adequate shade through the use of street trees and where appropriate, overhead trellis-like structures.
- Provide safe crosswalks at intersections through the use of street bulb-outs and special paving patterns.
- Provide for Class II bicycle lanes on streets throughout the NASA Research Park.
- Where possible, select California native street trees for each street that are appropriate to its scale and purpose. Any proposed exceptions shall be subject to approval by the NASA Architectural and Planning Design Review Boards.
- Provide setbacks for buildings that reflect both the urban character of the projected development and the landscaped setbacks common in the Historic District and on the Ames Campus.

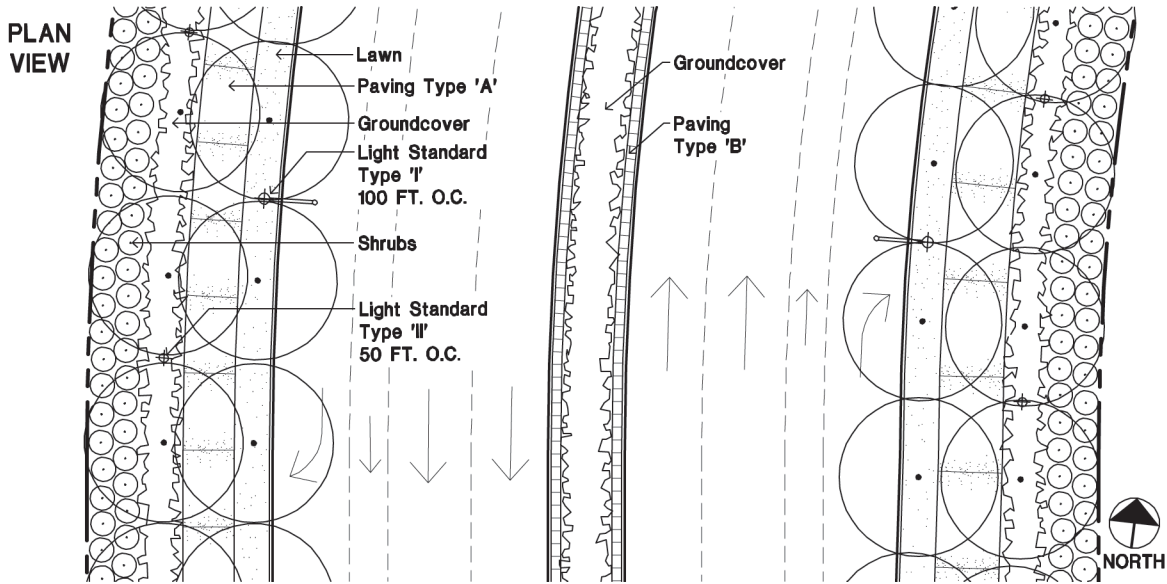
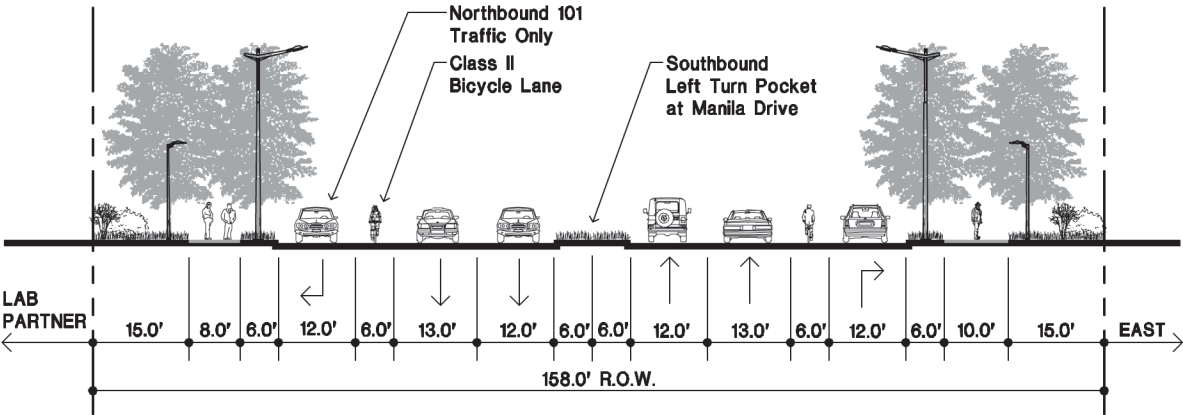
# Guidelines

## Ellis Street Extension from US 101 to Manila Drive

This section of roadway will require two travel lanes in the southbound and northbound direction with a curb lane in the southbound direction dedicated to the northbound on-ramp of US 101. A landscaped median will separate the traffic and provide a pleasing entrance into the NRP. The median will be interrupted to allow for a southbound left-turn pocket at Manila Drive. A double row of California Sycamore trees and wide parkway strip will allow for safe and comfortable pedestrian movement. The California Sycamore trees were selected for Ellis Street Extension and Cody Road due to their large height and spread which is appropriate for the large Right-of-Ways, and to provide interest throughout all seasons of the year.



ELLIS STREET EXTENSION FROM US 101 TO MANILA DRIVE  
SECTION AA'

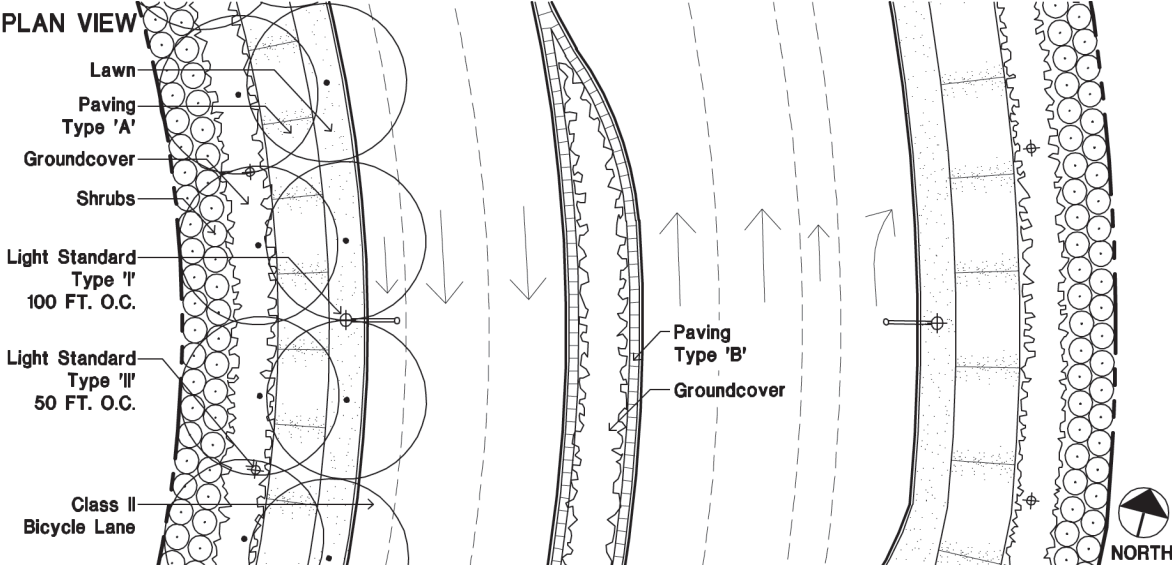
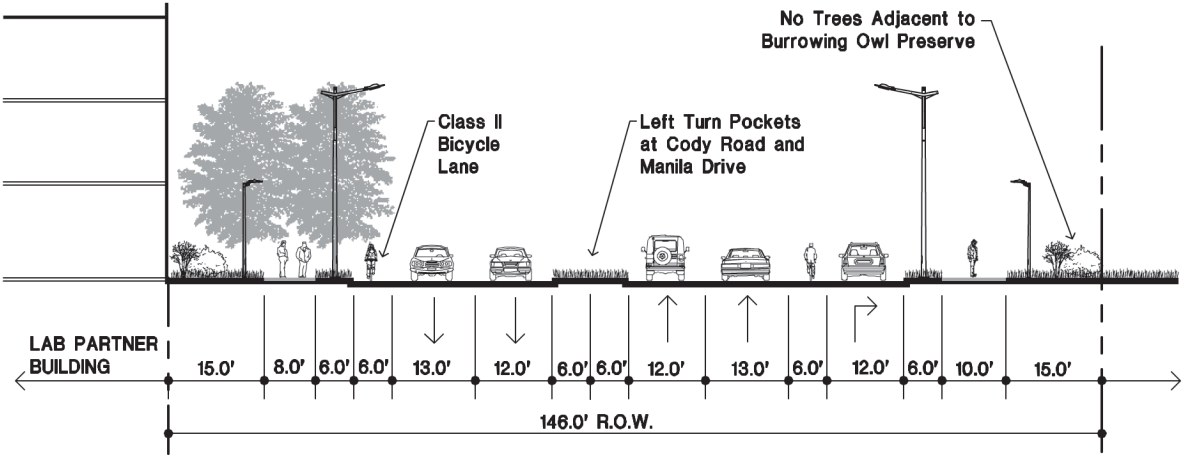


**Ellis Street Extension from Manila Drive to  
Cody Road**

The roadway in this section includes four travel lanes with left turn pockets within the median at Manila Drive and Cody Road. A designated right turn lane is provided to Cody Road in the northbound direction. The width of the street ROW will remain constant and the landscape median and bicycle lanes are still present. The street ROW after Cody Road will vary between build-to lines; however, a double row of a different tree species of tree will continue on axis to the Town Center to emphasize the axial views and provide pedestrian scaled sidewalks (see Street Section CC' and DD').

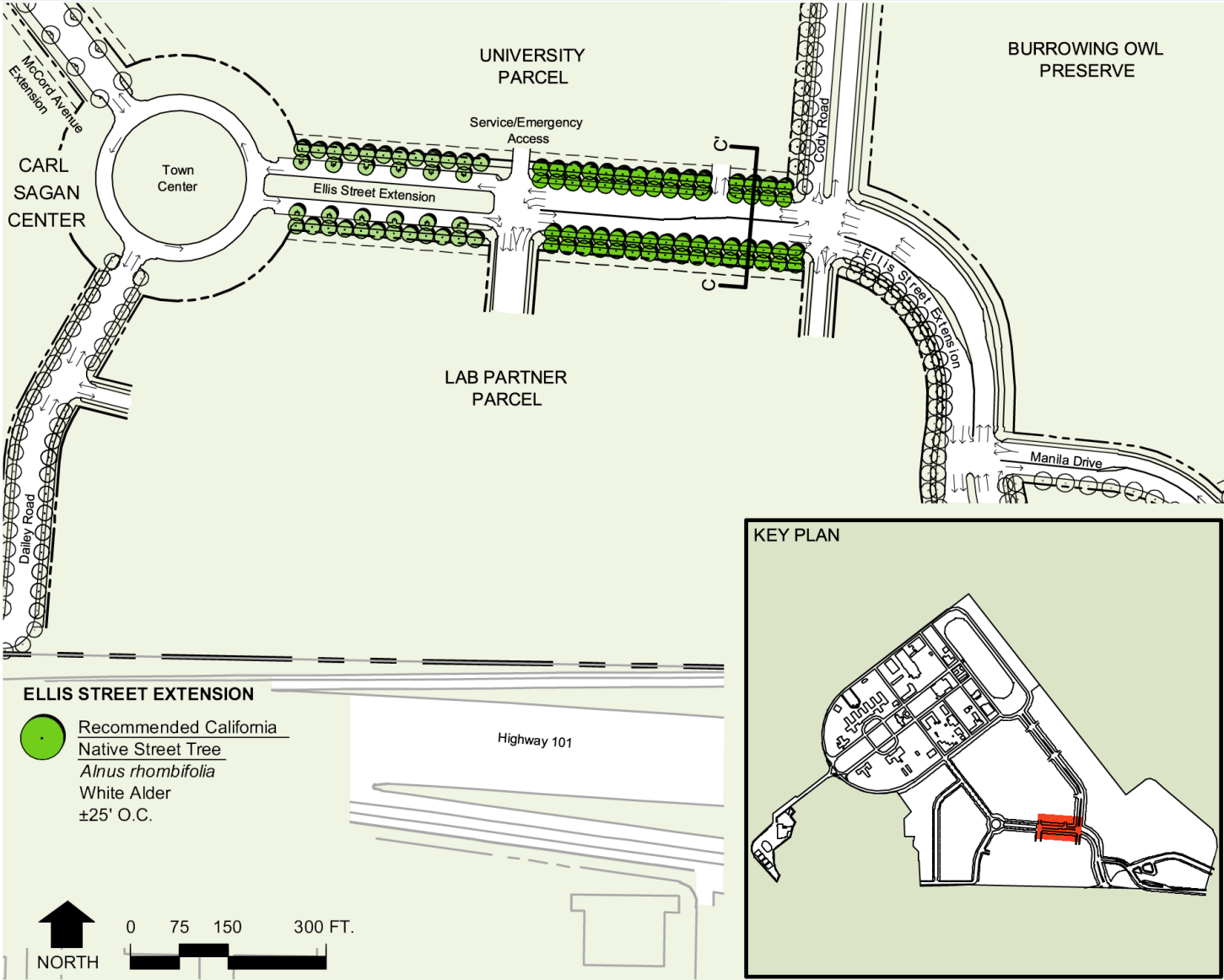


ELLIS STREET EXTENSION FROM MANILA DRIVE TO CODY ROAD  
SECTION BB'



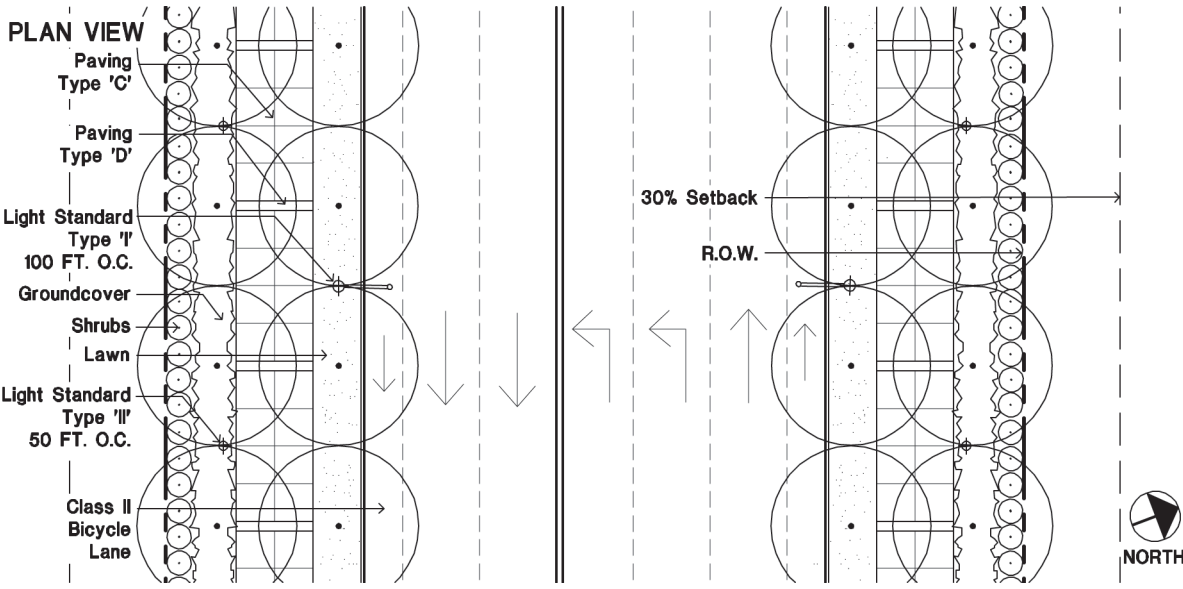
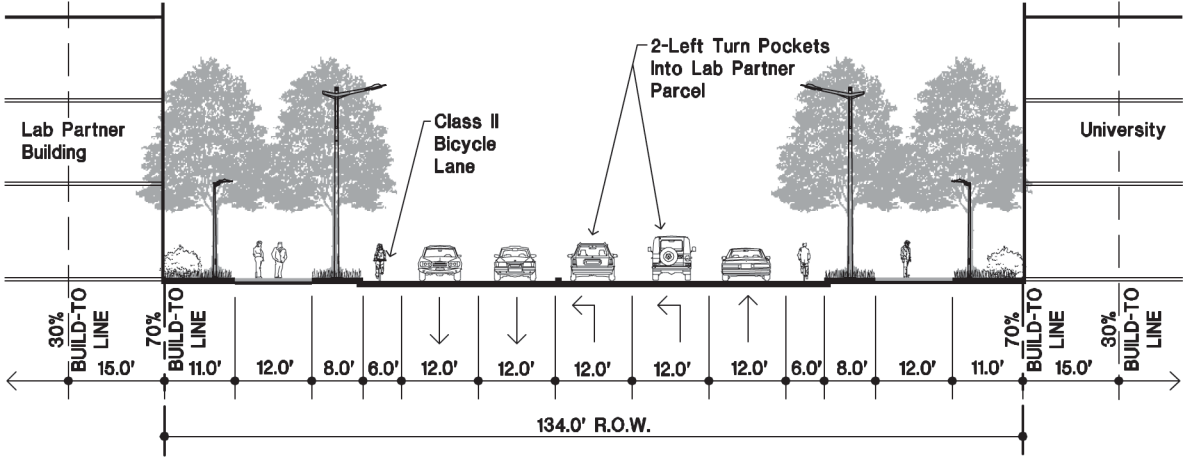
***Ellis Street Extension from Cody Road to its Mid-point***

The four-lane roadway will continue on axis with the Town Center and the Carl Sagan Center. Two left turn lanes in the westbound direction will be provided for access to the Lab Partner parcel, parking structures and surface lots. The far right lane in the westbound direction will continue towards the Town Center and allow a right turn into the University's Visitor Center and service drives. The streetside parkway strip and the double row of White Alder trees will continue on axis to the Town Center. The White Alder trees were selected for their conical shape and deciduous character providing year-round interest. Although White Alders have an aggressive root system, their other growth characteristics are noteworthy. Installation of root barrier systems with the planting of this tree species is recommended.



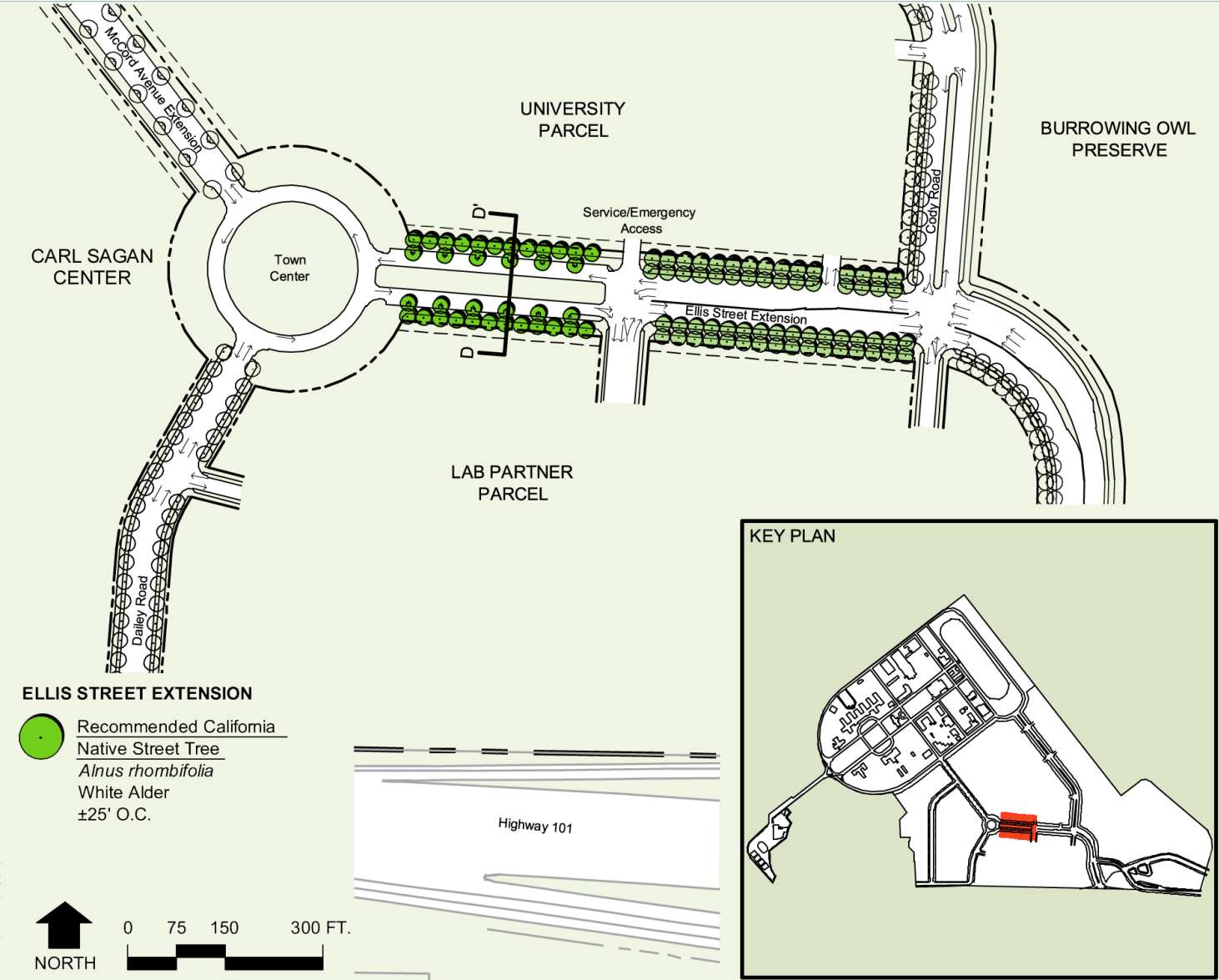


ELLIS STREET EXTENSION FROM CODY ROAD TO ITS MID-POINT  
SECTION CC'



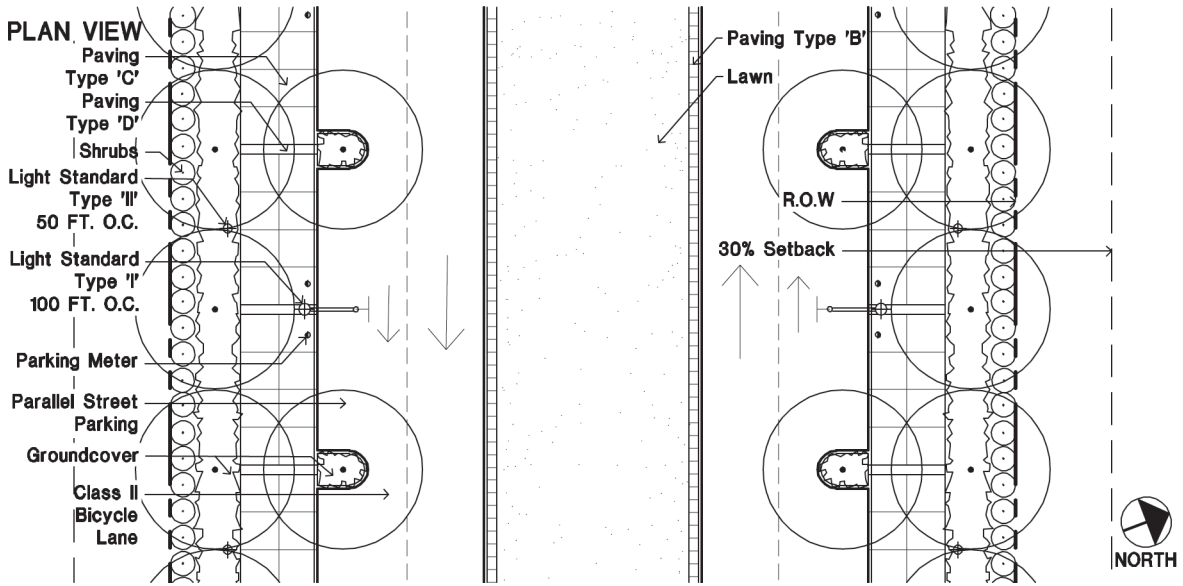
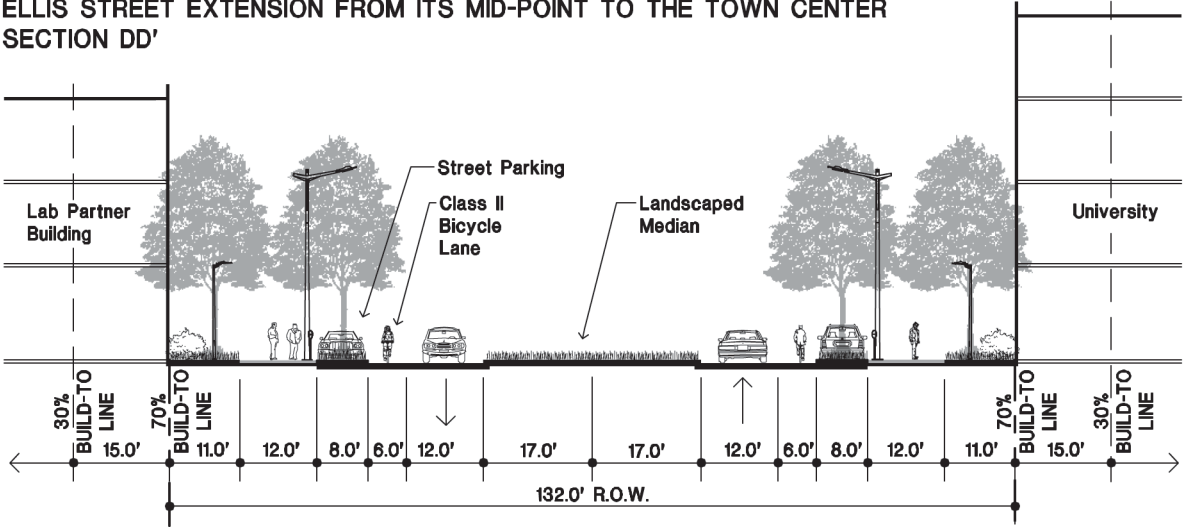
**Ellis Street Extension from its Mid-point to the Town Center**

By this location, the majority of traffic will have dispersed to access parking locations, allowing for the removal of one travel lane in each direction. In order to keep a consistent building setback zone along the Ellis Street Extension and a consistent tree placement leading to the Town Center, the median width is increased and an on-street parking lane is introduced adjacent to the sidewalk. The double row of White Alder trees will continue; however, the spacing of the inside rows will alternate in between every two parallel parking spaces.



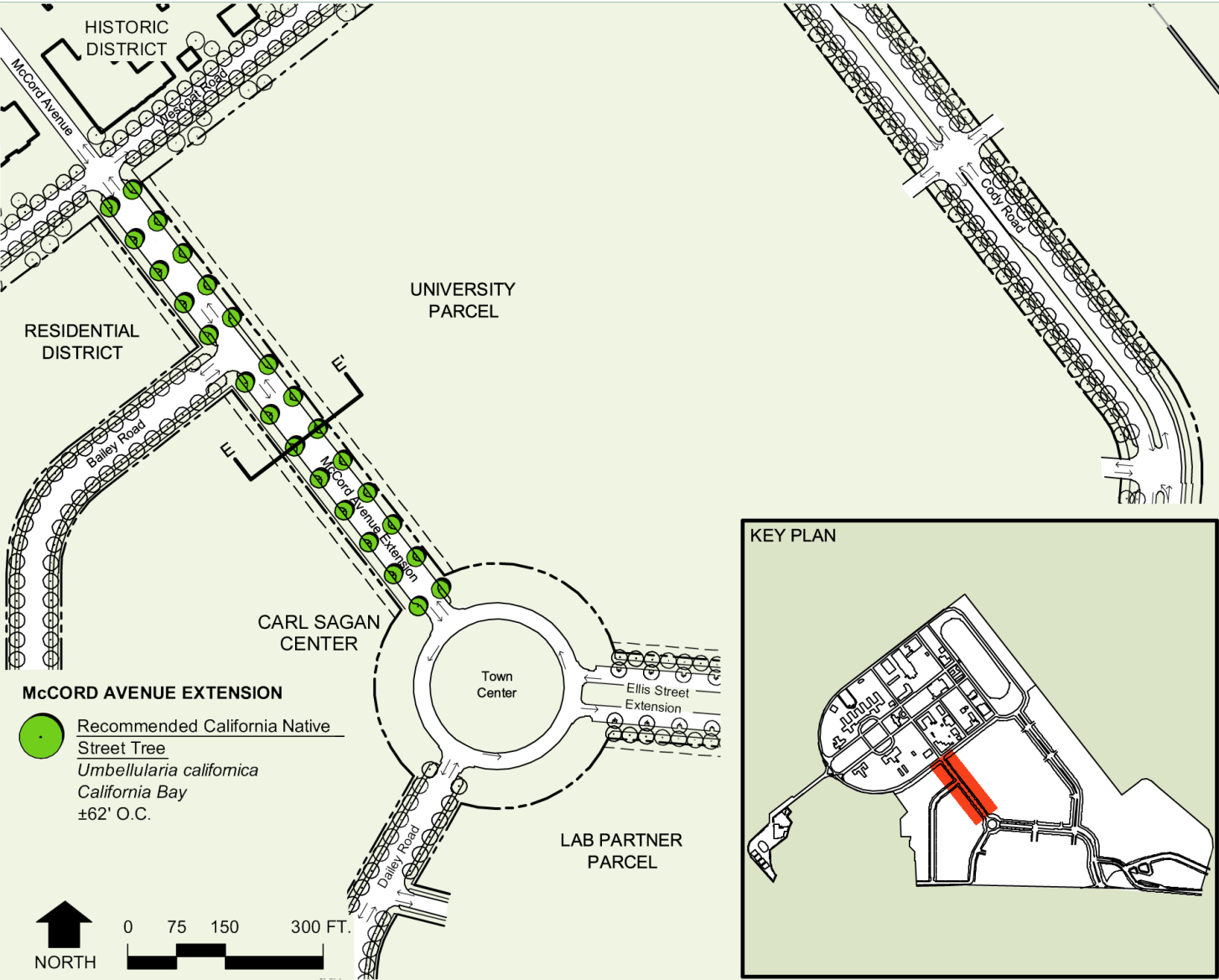


ELLIS STREET EXTENSION FROM ITS MID-POINT TO THE TOWN CENTER  
SECTION DD'

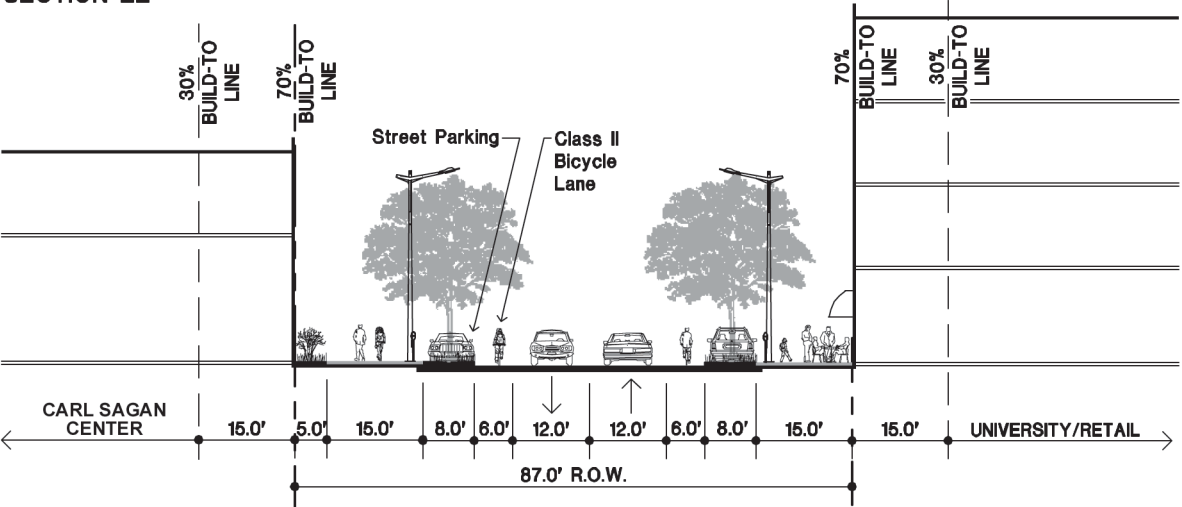


**McCord Avenue Extension from Town Center to Wescoat Road**

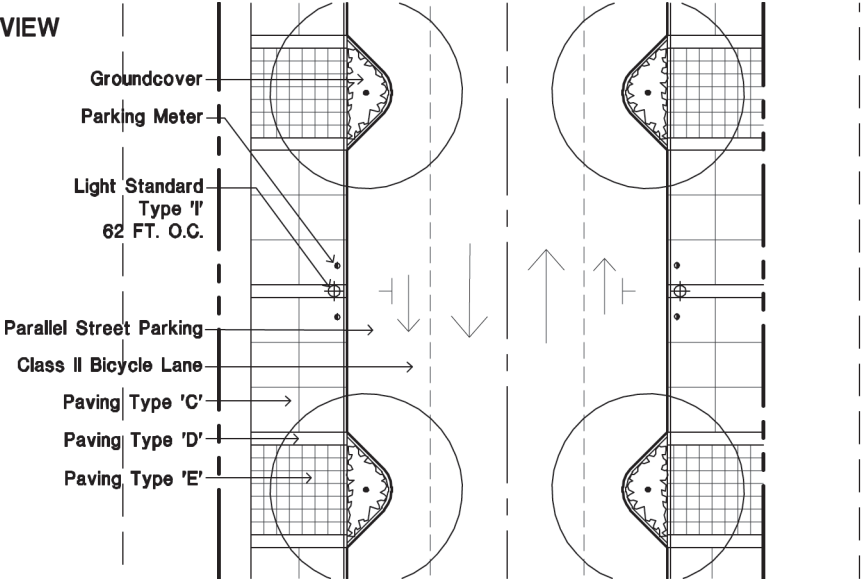
This section of roadway is projected to be the most urban street in character due to the presence of planned ground floor retail facilities in conjunction with development of the University parcels. The median has been removed and the street ROW is 87 feet, allowing for a more pedestrian scaled experience. The street will contain two-travel lanes, on-street parallel parking with no parkway strips, and 15' sidewalks to allow for small outdoor seating and display areas. The California Bay trees will be planted in small areas between every two-parked car spaces providing rhythm and balance along the retail avenue, but still allowing the presence of the retail frontage to engage the street between each tree.



McCORD AVENUE EXTENSION FROM THE TOWN CENTER TO WESCOAT ROAD  
SECTION EE'

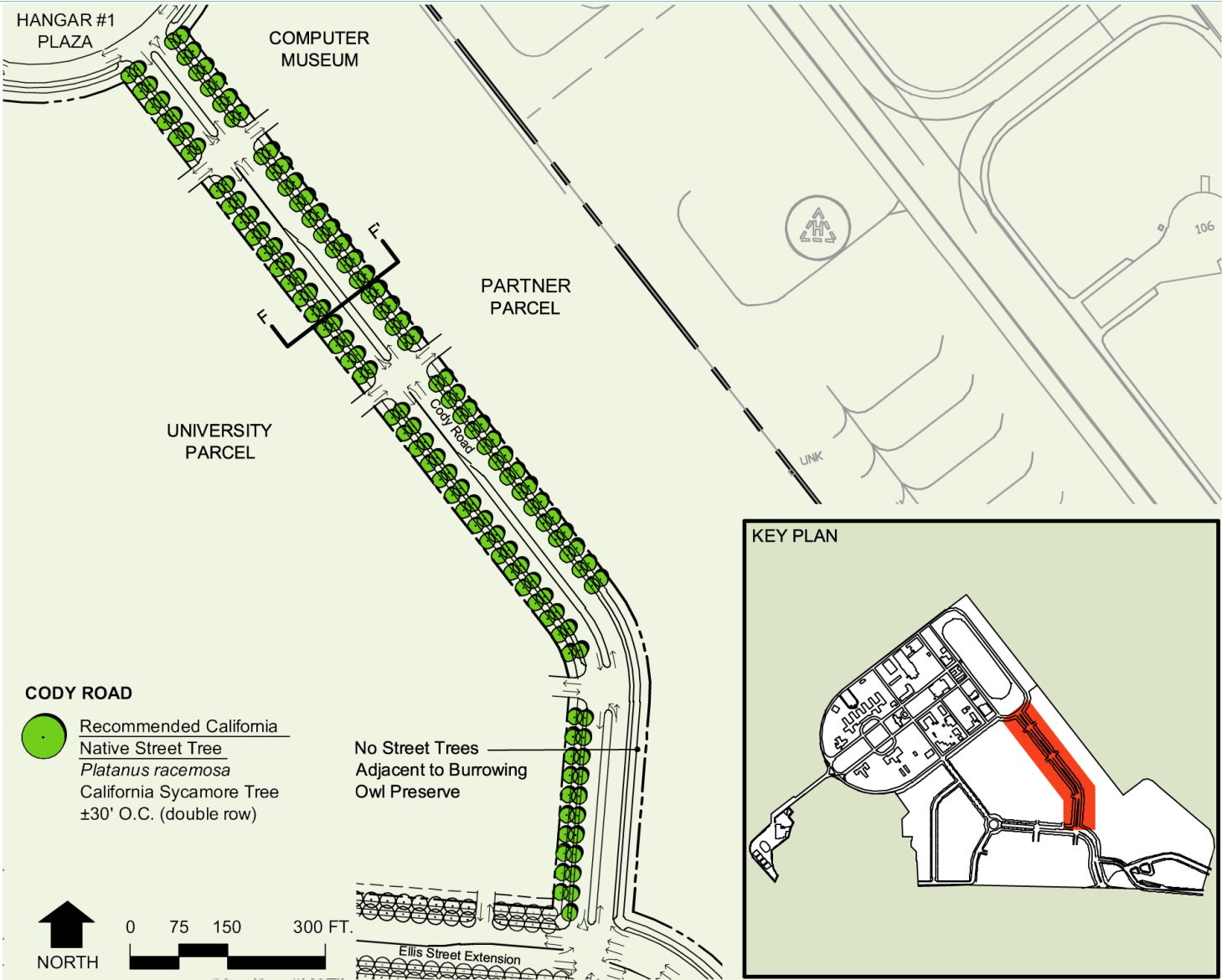


PLAN VIEW

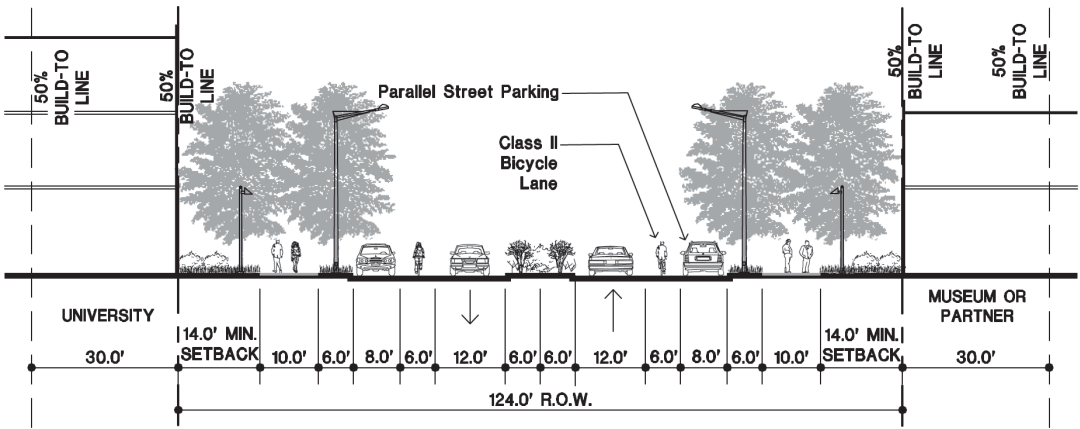


Cody Road

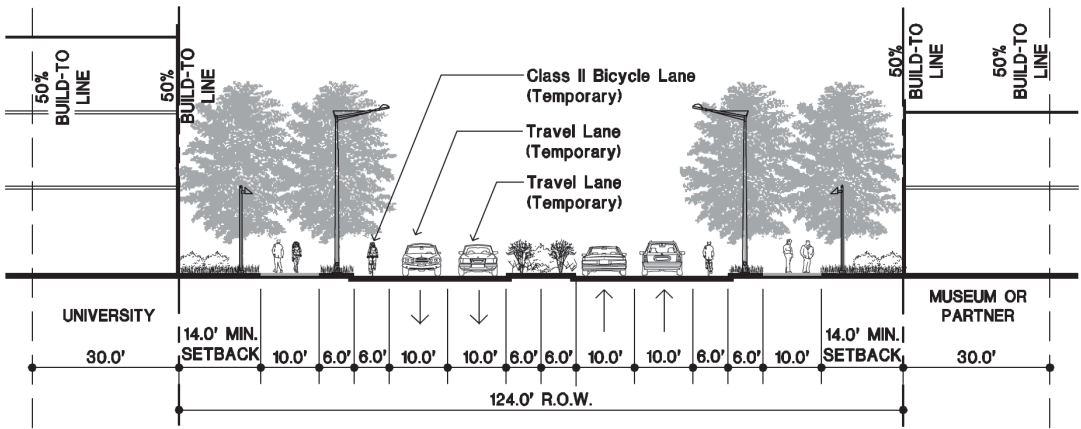
Due to the potential for significantly large public events at the California Air and Space Center, the ROW for Cody Road has been design for two alternative travel lane configurations. During normal activity, Cody Road is designed for two travel lanes, Class II bicycle lanes, and on-street parallel parking. Left-turn pockets will be incorporated in the median at key locations into the University campus and crosswalks established to connect the parcels east of Cody Road (e.g. The Computer History Museum). A generous landscape setback with a double row of California Sycamore trees is established to highlight views of Hangar One, and also to screen parking structures. During times of special events, Cody Road can be modified with temporary lane markers to accommodate four lanes of travel and Class II bicycle lanes. On-street parallel parking will be restricted during these times to accommodate the increased traffic flow.



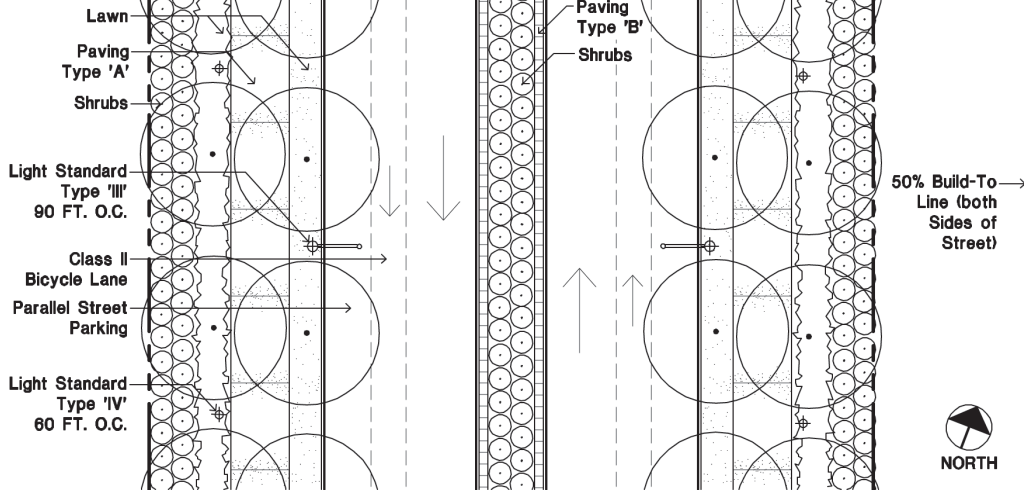
CODY ROAD  
SECTION FF'



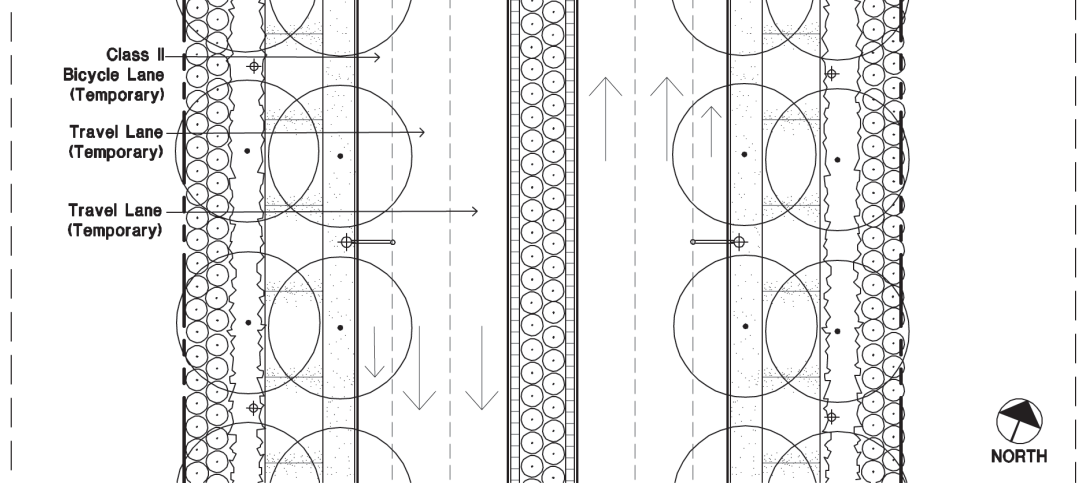
CODY ROAD-SPECIAL EVENTS  
SECTION FF'



PLAN VIEW



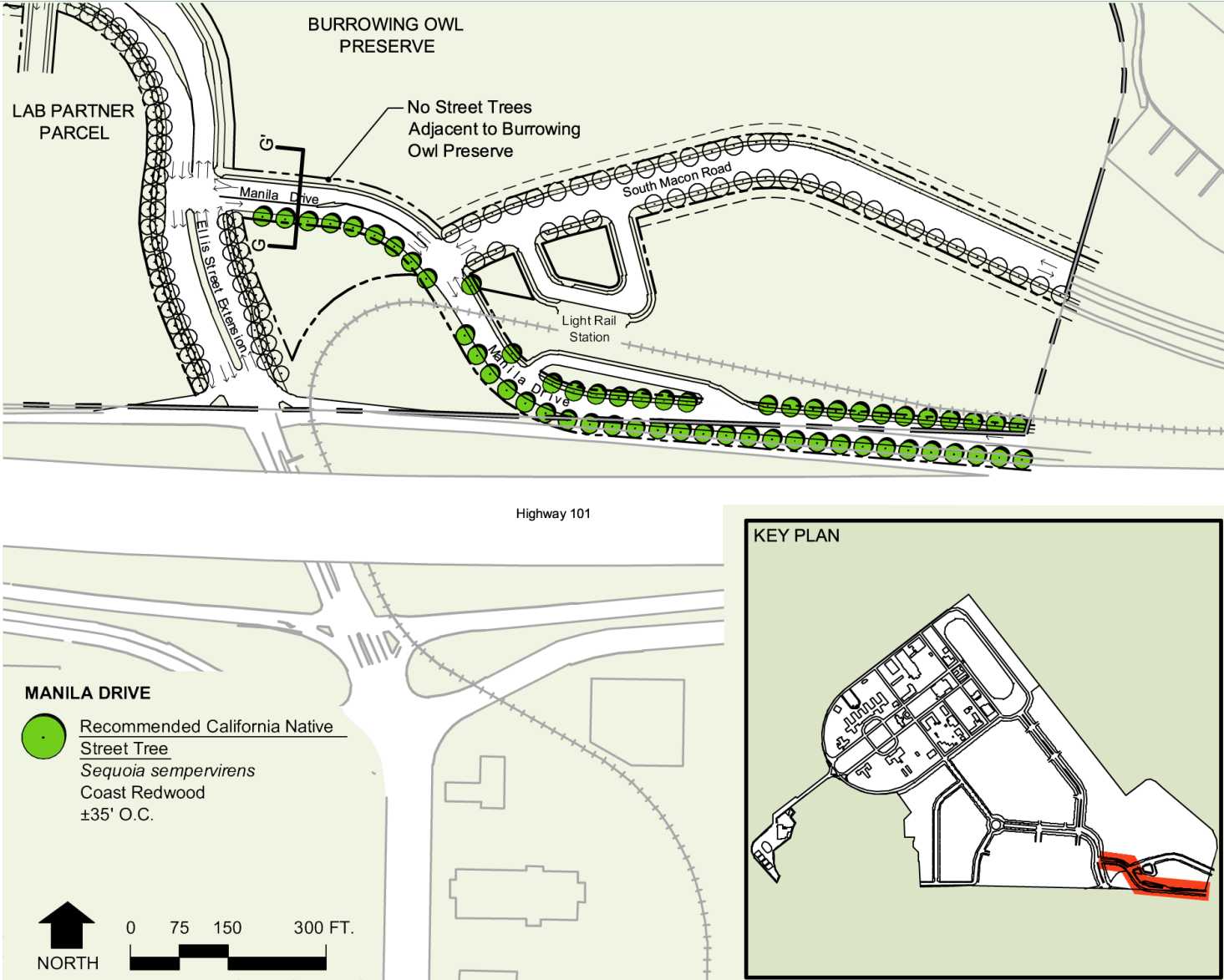
PLAN VIEW



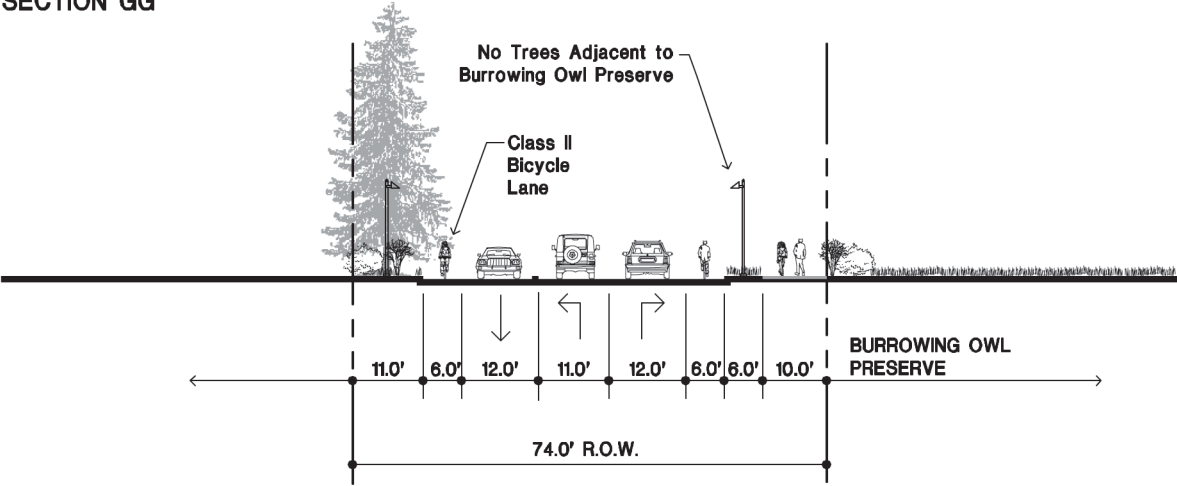


**Manila Drive**

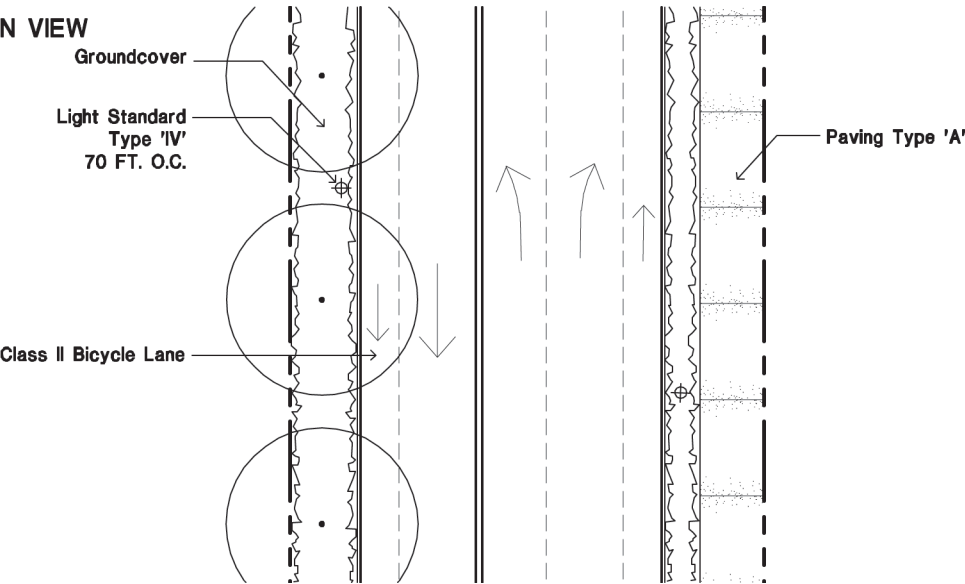
Manila Drive functions as a frontage road to US 101 and SR 237 connecting the NASA Research Park to Moffett Field and other high-tech companies. The light rail line traverses parallel to Manila Drive. The ROW for Manila Drive will include two travel lanes and a sidewalk (on the north side of the road) to the intersection of the realigned South Macon Road. Pedestrian access to the light rail station will be via South Macon Road and the Transit Green. The Coast Redwood tree is proposed, to be consistent with other tree plantings along the Highway 101 frontage. This tree has a pyramidal canopy and a picturesque growth habit.



MANILA DRIVE AT ELLIS STREET EXTENSION  
SECTION GG'



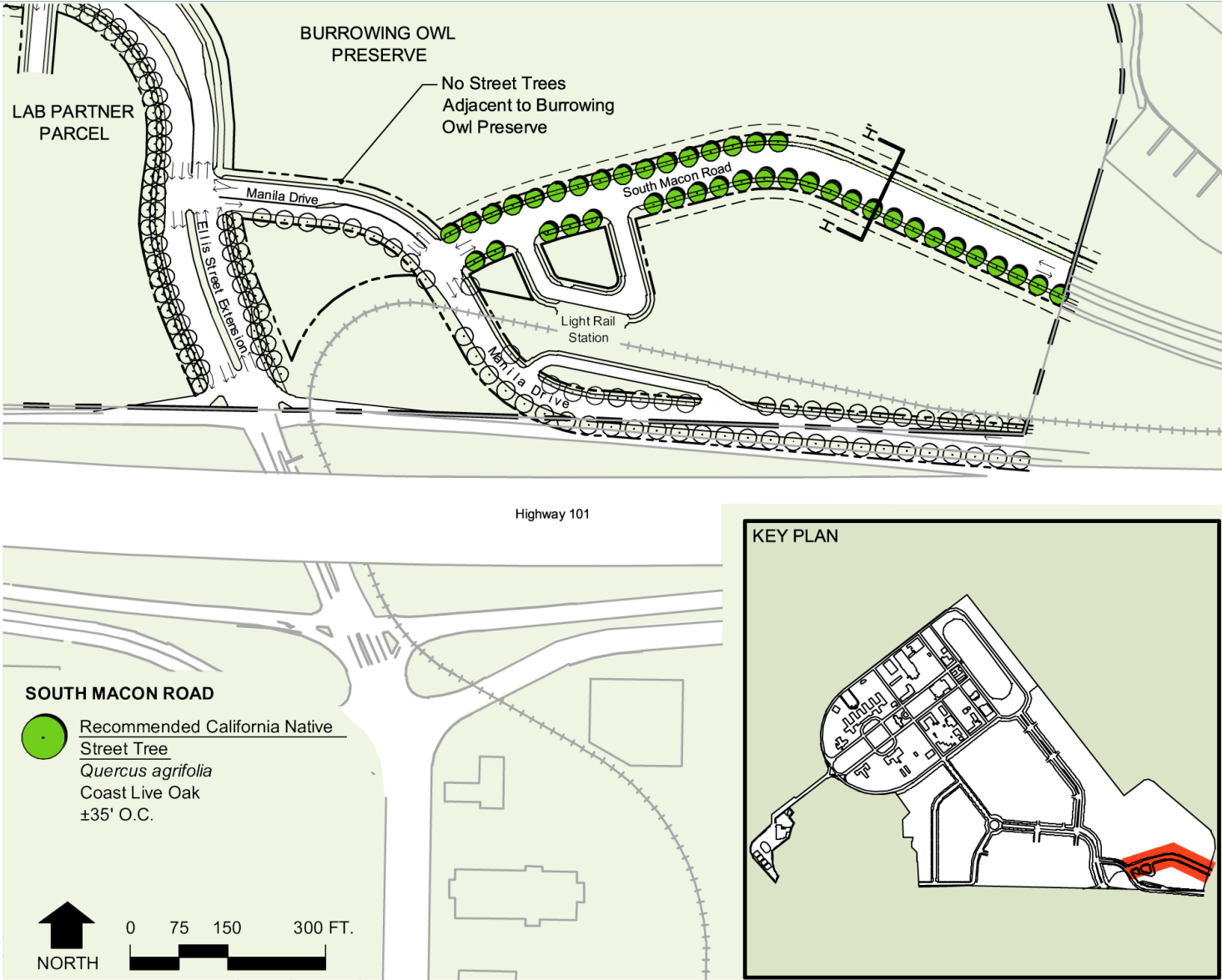
PLAN VIEW



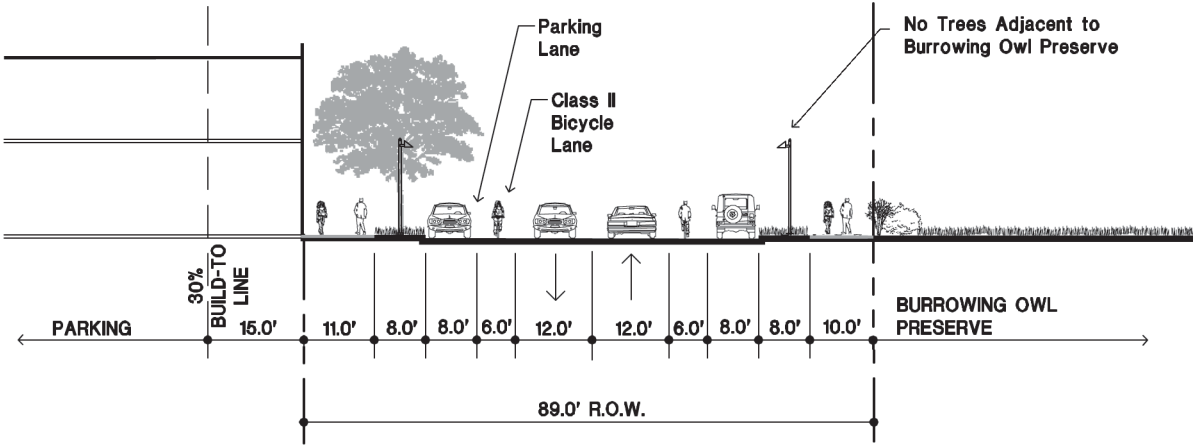


**South Macon Road**

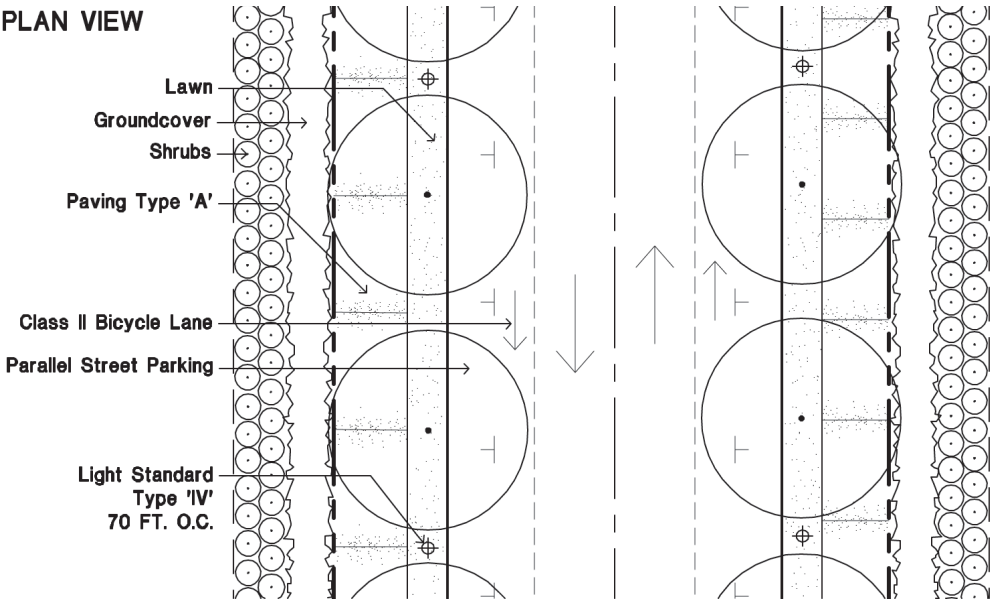
This road will require two travel lanes and include on-street parking, a parkway strip and sidewalks. Coast Live Oak trees and other landscape elements will be added to enhance the pedestrian experience; however, no trees shall be planted adjacent to the Burrowing Owl preserve in an effort to lessen the nesting habitat for predatory bird species. With time the Coast Live Oaks can become majestic trees with a distinctive branching structure. Pedestrian/bicycle access to the light rail station will occur either on Class II bikeways, or sidewalks adjacent to the Owl Preserve.



SOUTH MACON ROAD  
SECTION HH'

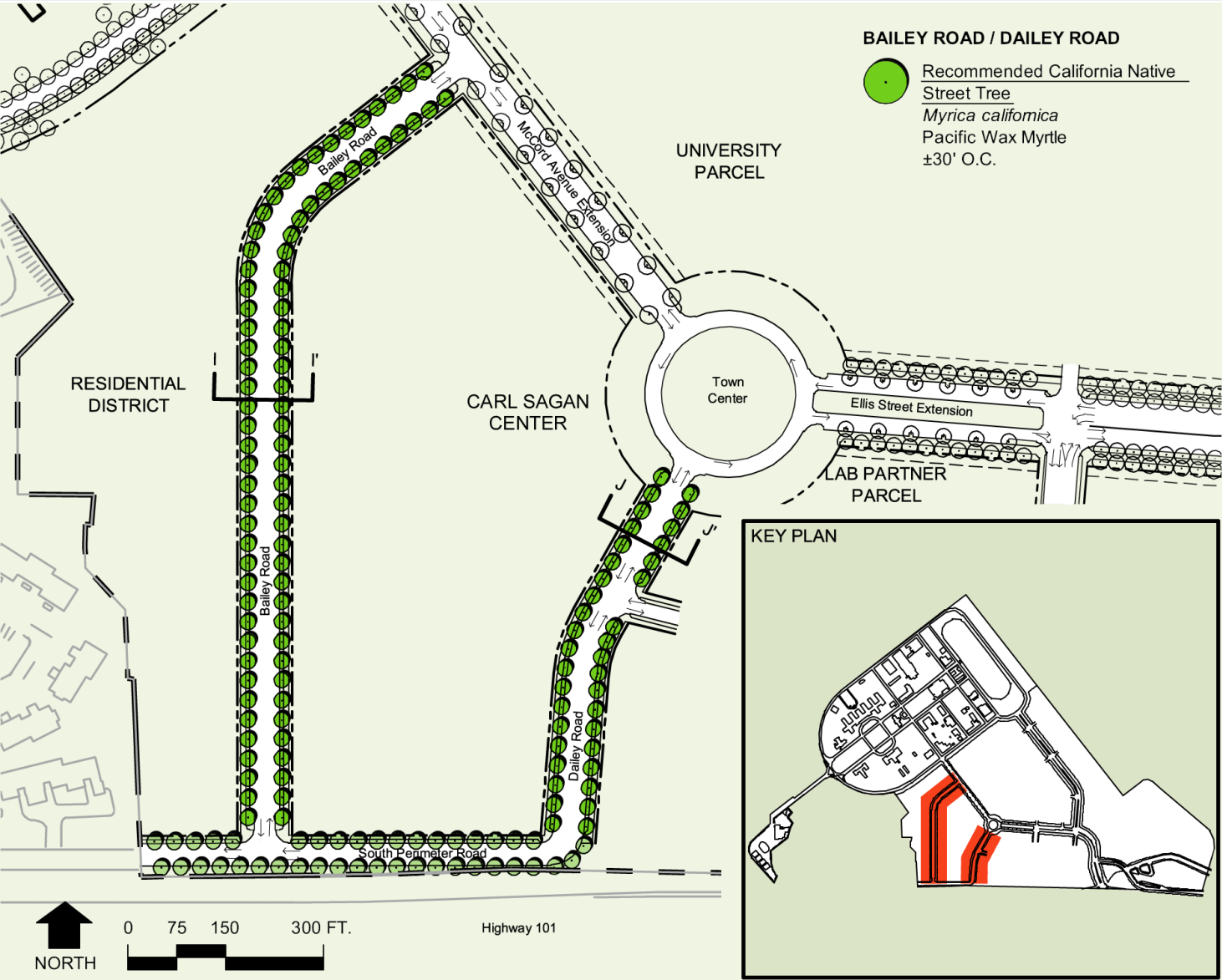


PLAN VIEW

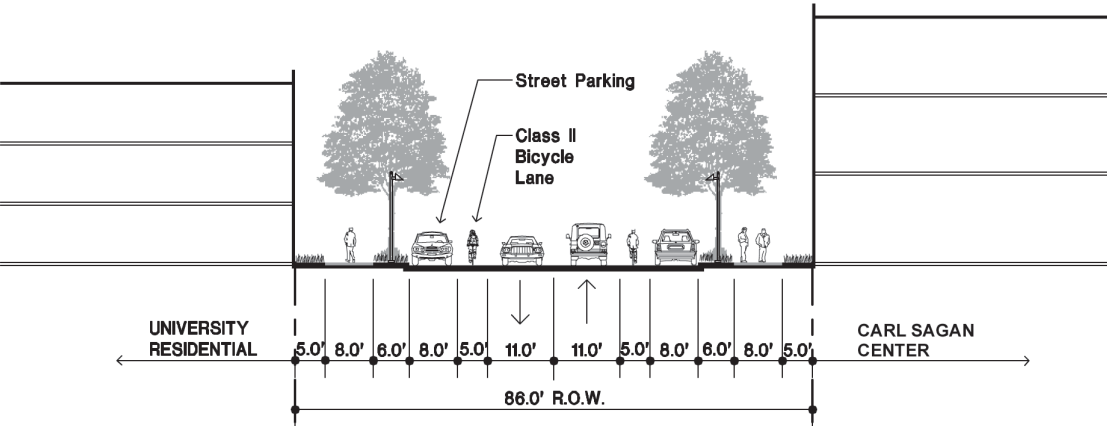


**Bailey Road and Dailey Road**

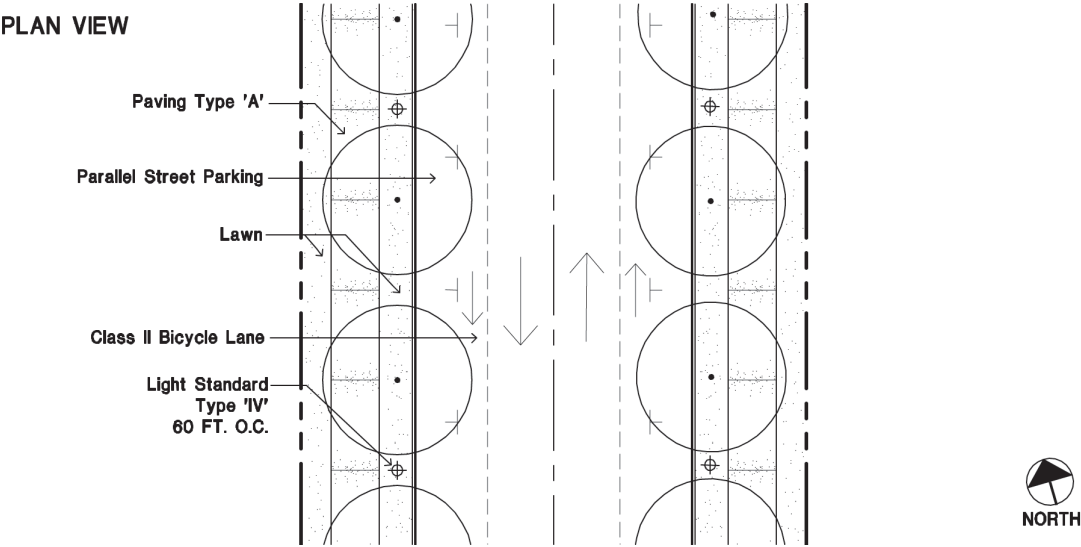
These two roads connect the Town Center and McCord Avenue Extension with the Perimeter Road. Similar to South Macon Road, they will have two travel lanes, bicycle lanes, on-street parallel parking, parkways, and sidewalks and shade trees. The proposed tree is the Pacific Wax Myrtle, a small pedestrian-scaled evergreen tree with clean-looking dark glossy green foliage present throughout the year.



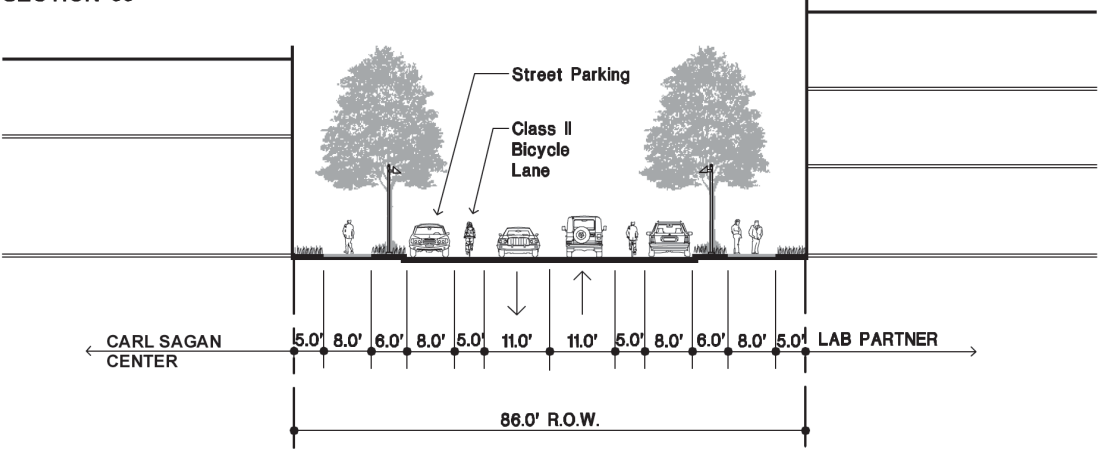
BAILEY ROAD  
SECTION II'



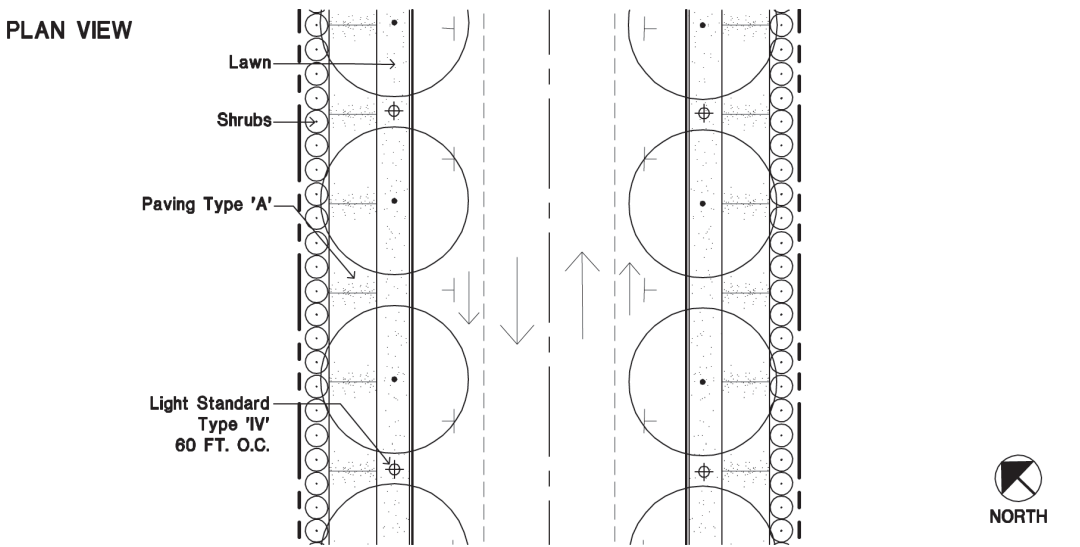
PLAN VIEW



DAILEY ROAD  
SECTION JJ'

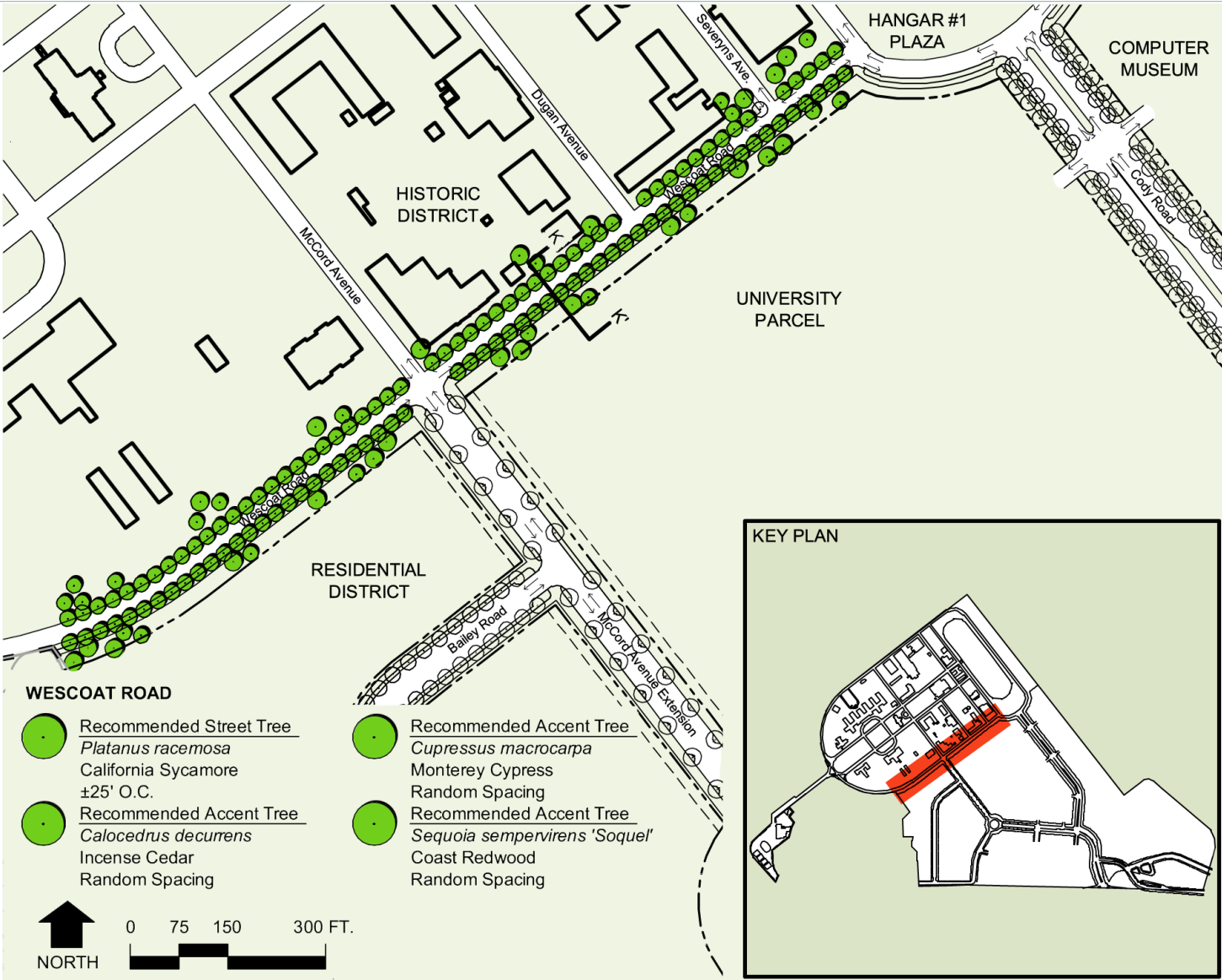


PLAN VIEW



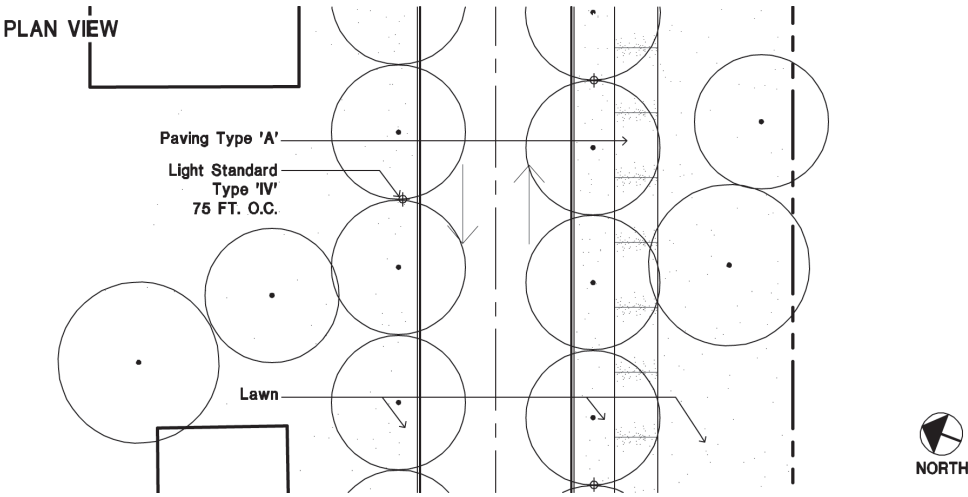
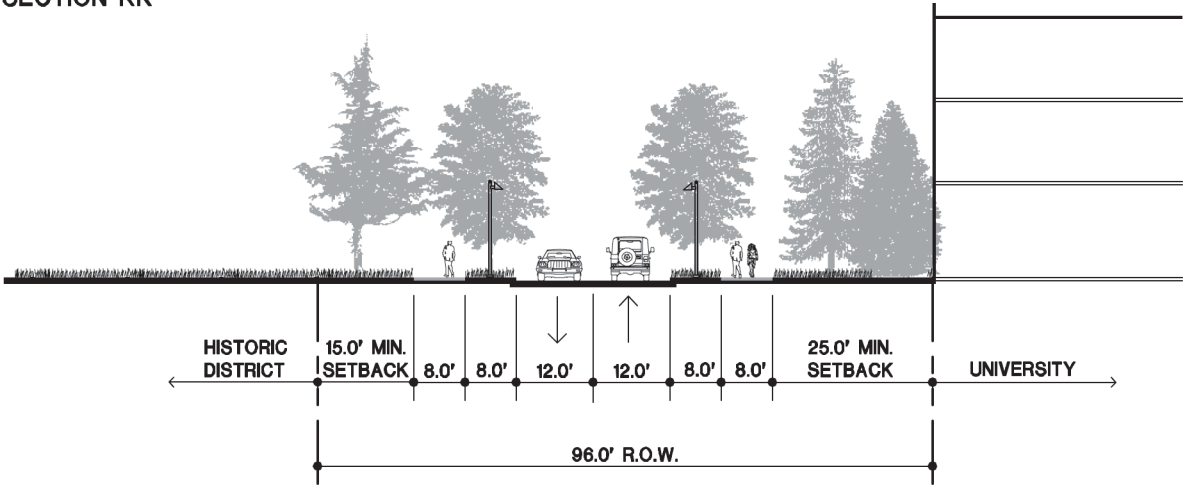
**Wescoat Road**

Wescoat Road is located in the Historic District, and deserves special attention to be consistent with the character of the District. Buildings are typically setback 36 feet minimum from the curb with generous lawn and shrub plantings. Street tree planting between the sidewalk and ROW should be informal with a combination of California native accent trees. However, a more formal allee of California Sycamore trees are also proposed along the parkway strips to mirror the trees on the north side of the Historic District and to reflect the historic master planning vision.





WESCOAT ROAD  
SECTION KK'



# PLANT MATERIALS

## Landscape Concept

The Historic District is strongly identified by large open views of significant buildings and tree allees along the major streets. The newer buildings and places to be constructed south of Wescoat Road in the NASA Research Park (NRP) will be constructed at a higher density, thus necessitating a more urban approach to the environment. In general, the public ROW will define the landscape with tree-lined streets opening up into plazas that frame important buildings (e.g. Carl Sagan Center, Hangar One, and light rail station). Where the landscape will have less structure is on the perimeter with US 101 where tree massing will predominate and the Open Space Preserve where open grasslands are necessary to maintain the Burrowing Owl habitat.

## Goals

- Implement a strictly California native plant palette for all plant material in the NASA Research Park. Specifically, utilize drought tolerant/low maintenance California natives with similar hydrozones where feasible.

- Develop a clear hierarchy of tree and plant massings to indicate points of emphasis, define districts, suggest vistas, etc.
- Maintain a buffer planting along US 101 that relates to existing vegetation along the highway corridor.
- Implement sustainable landscape design strategies at the site level of design by adhering to all applicable laws and regulations, and develop a design that encourages resource efficiency, minimizes destruction of natural and cultural resources, and maximizes environmental health and safety.

## Guidelines

The following guidelines express the desired approaches to developing the landscape concept:

- Adopt strictly California native vegetation and wildflowers. Any proposed exceptions shall be subject to approval by the NASA Design Review Board.
- Use low maintenance California natives with

high drought resistance.

- Tree massing should incorporate regular spacing within the public ROWs and plazas except the perimeter buffer areas and Burrowing Owl habitat.
- Similar tree species should be used to define key roadways, specifically the Ellis Street Extension and Cody Road. Only mature street trees with large spreading canopies are desirable (24" box minimum size at installation).
- Different species of trees are suggested for each major street to define districts and provide interest/diversity.
- Trees planted directly adjacent to streets should be planted within four feet of the curb and sidewalk to provide canopies that extend into the street and provide shade over sidewalks.
- Trees planted in pavements should have a minimum tree well area of 16 square feet, with porous paving a desirable condition (e.g. pavers over sand and gravel setting beds rather than concrete sub-base and/or grout filled joints).
- Flowering accent trees are desirable away from the main streets at entrances from parking lots

or internal greenways, or at gateways and plazas.

- Where possible, overhead shade canopies from vegetation, trellises, and arbors or within building arcades is encouraged to facilitate pedestrian movement.
- Shrub and groundcover massing of the same plant species is more desirable than mixing single or few species together.
- Wind and solar orientation and hydrozone delineation should guide the plant selections.
- Conserve water; install reclaimed water recovery system for landscape irrigation.
- Minimize use of herbicides, pesticides, fertilizers and other chemicals.
- Massing of plant material should reflect species with similar water requirements and ecological associations.
- The use of traditional lawns should be kept to a minimum, except in formal areas of high use (e.g. campus “quads/greens” and parkway planting adjacent to parallel street parking).
- All non-lawn areas should receive a minimum

of two to four inches of mulch that is of similar material and dark in color.

- Compost all leaf trimmings, wood fiber and cellulose.
- Use plants as a barrier for vehicle exhaust.

## NASA Research Park Design Guide - California Native Plant Palette Study

Project Location: Moffett Field, California (Adjacent to San Francisco Bay near San Jose, Palo Alto, Mountain View - *Sunset Western Garden Book "Zone 17"*)**TREES**

BOTANICAL NAME COMMON NAME	TYPE Evergreen/ Deciduous	SIZE Height x Spread	ATTRIBUTES Flowers	Fall Color	Sun/ Shade	Drought Tolerant	Shape	Design Application	Nursery Available	Contract Growing	NATIVE LOCATION COMMENTS
<i>Abies bracteata</i> Santa Lucia Fir	E	60' x 20'	Inconspicuous	No	Sun	Yes	Pyramidal	Background	No	No	Santa Lucia Mountains, Monterey County
<i>Abies concolor</i> White Fir	E	30' x 20'	Inconspicuous	No	Sun	Yes	Pyramidal	Accent	Yes	Yes	Mountians Larger growth in native setting
<i>Abies grandis</i> Grand Fir	E	150' x 100'	Inconspicuous	No	Sun		Pyramidal	Background	No	Possibly	Coastal Ranges Large growth in native setting
<i>Acer circinatum</i> Vine Maple	E	25' x 30'	Showy	Yes	Sun/Shade		Round Crown	Espaliers	No	Possibly	Coastal Mountain Streams
<i>Acer macrophyllum</i> Bigleaf Maple	D	95' x 95'	Showy	Yes	Sun		Round Crown	Street Tree	Yes	Yes	Foothill Streams
<i>Acer negundo</i> Box Elder	D	50' x 50'	Inconspicuous	Yes	Sun		Round Crown	Street Tree	Possibly	Yes	Throughout California Seeds Readily, Considered a Weed
<i>Aesculus californica</i> California Buckeye	D	20' x 30'	Very Showy	Yes	Sun		Round Crown	Accent	Possibly	Yes	Dry Slopes and Canyons
<i>Alnus rhombifolia</i> White Alder	D	70' x 40'	Inconspicuous	Yes	Sun		Conical	Street Tree	Yes	No	Foothill Streams
<i>Arbutus menziesii</i> Madrone	E	30' x 30'	Showy	No	Sun	Yes	Round Crown	Background	No	Possibly	Costal and Sierra Foothills Difficult as Ornamental
<i>Calocedrus decurrens</i> Incense Cedar	E	40' x 80'	Inconspicuous	No	Sun		Pyramidal	Buffer/Screen	Yes	Yes	Sierra Mountain Range
<i>Cercis occidentalis</i> Western Redbud	D	15' x 15'	Very Showy	Yes	Sun	Yes	Round Crown	Accent	Yes	Yes	Foothills below 4,000 ft.
<i>Cornus nuttallii</i> Pacific Dogwood	D	50' x 20'	Showy	Yes	Sun	Yes	Conical	Accent	No	Possibly	Northern California
<i>Cupressus forbesii</i> Tecate Cypress	E	20' x 20'	Inconspicuous	No	Sun	Yes	Round Crown	Background	No	Possibly	Santa Ana Mountains Very Low Branching
<i>Cupressus macrocarpa</i> Monterey Cypress	E	40' x 40'	Inconspicuous	No	Sun		Pyramidal	Background	Yes	Yes	Monterey Peninsula
<i>Dendromecon harfordii</i> Island Bush Poppy	E	20' x 15'	Showy	No	Sun	Yes	Round Crown	Buffer/Screen	No	Yes	Santa Cruz and Santa Rosa Islands Small Tree
<i>Fraxinus dipetala</i> Foothill Ash	D	15' x 15'	Showy	Yes	Sun	Yes	Round Crown	Accent	No	Yes	Foothills
<i>Fraxinus latifolia</i> Oregon Ash	D	70' x 60'	Inconspicuous	Yes	Sun	Yes	Round Crown	Background	No	Yes	Northern Coastal Ranges
<i>Juniperus californica</i> California Juniper	E	40' x 40'	Inconspicuous	No	Sun	Yes	Round Crown	Buffer/Screen	No	Possibly	California
<i>Lithocarpus densiflorus</i> Tanbark Oak	E	80' x 60'	Inconspicuous	No	Sun		Round Crown	Street Tree	No	Possibly	Coastal Ranges of Santa Barbara County Subject to Sudden Oak Death
<i>Lyonothamnus floribundus asplenifolius</i> Catalina Ironwood	E	40' x 25'	Showy	No	Sun	Yes	Conical	Background	No	Yes	Channel Islands Good as Screen Tree
<i>Myrica californica</i> Pacific Wax Myrtle	E	25' x 25'	Inconspicuous	No	Sun	Yes	Round Crown	Street Tree	Possibly	Yes	Coast and Coastal Valleys

TREES											
BOTANICAL NAME COMMON NAME	TYPE Evergreen/ Deciduous	SIZE Height x Spread	ATTRIBUTES Flowers	Fall Color	Sun/ Shade	Drought Tolerant	Shape	Design Application	Nursery Available	Contract Growing	NATIVE LOCATION COMMENTS
<i>Picea sitchensis</i> Sitka Spruce	E	150' x 60'	Inconspicuous	No	Sun		Pyramidal	Background	No	Possibly	Mountain Ranges
<i>Pinus coulteri</i> Coulter Pine	E	70' x 70'	Inconspicuous	No	Sun	Yes	Round Crown	Background	Possibly	Yes	Dry Foothills Needs Room, Large Pine Cones
<i>Pinus edulis</i> Nut Pine	E	15' x 15'	Inconspicuous	No	Sun	Yes	Round Crown	Accent	Possibly	Yes	Desert Mountains Good for Small Areas
<i>Pinus ponderosa</i> Western Yellow Pine	E	150' x 60'	Inconspicuous	No	Sun		Pyramidal	Background	Possibly	Yes	Mountain Ranges
<i>Pinus radiata</i> Monterey Pine	E	100' x 80'	Inconspicuous	No	Sun		Round Crown	Background	Possibly	Yes	Central California Coast
<i>Pinus sabiniana</i> Digger Pine	E	50' x 40'	Inconspicuous	No	Sun	Yes	Round Crown	Background	Possibly	Yes	Dry Foothills
<i>Pinus torreyana</i> Torrey Pine	E	60' x 50'	Inconspicuous	No	Sun	Yes	Round Crown	Background	Possibly	Yes	San Diego Coast and Santa Rosa Island
<i>Platanus racemosa</i> California Sycamore	D	80' x 70'	Inconspicuous	Yes	Sun		Round Crown	Street Tree	Yes	No	Streams in Foothills and Coastal Ranges
<i>Populus fremontii</i> Western Cottonwood	D	60' x 50'	Inconspicuous	Yes	Sun		Round Crown	Street Tree	Yes	No	Desert Watercourse Regions Plant Male Trees
<i>Populus trichocarpa</i> Black Cottonwood	D	150' x 150'	Inconspicuous	Yes	Sun		Round Crown	Background	Possibly	Yes	Coastal Ranges Very big and messy
<i>Prunus lyonii</i> Catalina Cherry	E	35' x 25'	Showy	No	Sun	Yes	Round Crown	Buffer/Screen	Possibly	Yes	Catalina Island Train to Tree, Messy Fruit
<i>Quercus agrifolia</i> Coast Live Oak	E	50' x 60'	Inconspicuous	No	Sun	Yes	Round Crown	Street Tree	Yes	No	Coastal Ranges
<i>Quercus chrysolepis</i> Canyon Live Oak	E	40' x 30'	Inconspicuous	No	Sun		Round Crown	Background	Possibly	Yes	Foothills
<i>Quercus douglasii</i> Blue Oak	D	50' x 50'	Inconspicuous	Yes	Sun	Yes	Round Crown	Background	Yes	No	Central Valley Foothills
<i>Quercus engelmannii</i> Engelmann Oak	E	50' x 60'	Inconspicuous	No	Sun	Yes	Round Crown	Street Tree	Possibly	Yes	Southern California
<i>Quercus lobata</i> Valley Oak	D	70' x 70'	Inconspicuous	Yes	Sun		Round Crown	Background	Yes	No	Coastal Ranges, Interior Valleys. and Sierra Foothills
<i>Quercus tomentella</i> Island Oak	E	50' x 60'	Inconspicuous	No	Sun		Conical	Background	No	Possibly	Channel Islands
<i>Quercus wislizenii</i> Interior Live Oak	E	50' x 60'	Inconspicuous	No	Sun		Round Crown	Background	Possibly	Yes	Sierra Foothills
<i>Sequoia sempervirens</i> Coast Redwood	E	90' x 30'	Inconspicuous	No	Sun		Pyramidal	Street Tree	Yes	No	Central to Northern Coastal Ranges
<i>Sequoiadendron giganteum</i> Giant Sequoia	E	180' x 50'	Inconspicuous	No	Sun	Yes	Pyramidal	Background	No	Possibly	Sierra Nevada Range Larger growth in native setting
<i>Umbellularia californica</i> California Bay	E	30' x 30'	Showy	Some	Sun		Round Crown	Street Tree	Yes	Yes	Coastal Ranges Larger growth in native setting



**SHRUBS**

BOTANICAL NAME COMMON NAME	TYPE Evergreen/ Deciduous	SIZE Height x Spread	ATTRIBUTES Flowers	Fall Color	Sun/ Shade	Drought Tolerant	Shape	Design Application	Nursery Available	Contract Growing	NATIVE LOCATION COMMENTS
<i>Achillea millefolium</i> Common Yarrow	Perennial	2' x 3'	Showy	No	Sun		Mound	General Massing	Yes	Yes	Channel Islands
<i>Aquilegia formosa</i> Western Columbine	Perennial	3' x 2'	Showy	No	Sun/Part Shade		Mound	General Massing	Yes	Yes	California
<i>Arctostaphylos densiflora</i> 'Howard McMinn' Sonoma Manzanita	E	5' x 7'	Showy	No	Sun	Yes	Mound	General Massing	Yes	Yes	Sonoma County
<i>Calycanthus occidentalis</i> Spice Bush	D	8' x 8'	Showy	Yes	Sun/Part Shade		Mound	Buffer/Screen	Yes	Yes	Moist Streams Coastal Ranges and Sierra Nevada Foothills
<i>Carpenteria californica</i> Bush Anemone	E	5' x 6'	Very Showy	No	Sun/Part Shade	Yes	Mound	Accent	Yes	Yes	Sierra Nevada Foothills
<i>Ceanothus</i> 'Concha' NCN	E	6' x 8'	Very Showy	No	Sun	Yes	Mound	General Massing	Yes	Yes	California
<i>Ceanothus</i> 'Frosty Blue' NCN	E	8' x 10'	Very Showy	No	Sun	Yes	Mound	General Massing	Yes	Yes	California
<i>Ceanothus</i> 'Joyce Coulter' NCN	E	4' x 9'	Very Showy	No	Sun	Yes	Mound	General Massing	Yes	Yes	California
<i>Ceanothus</i> 'Julia Phelps' NCN	E	5' x 8'	Very Showy	No	Sun	Yes	Mound	General Massing	Yes	Yes	California
<i>Ceanothus</i> 'Ray Hartman' NCN	E	18' x 18'	Very Showy	No	Sun	Yes	Mound	Buffer/Screen	Yes	Yes	California
<i>Ceanothus thysiflorus</i> 'Snow Flurry' NCN	E	10' x 8'	Very Showy	No	Sun	Yes	Mound	Buffer/Screen	Yes	Yes	California
<i>Cercis occidentalis</i> Western Redbud	D	15' x 15'	Very Showy	Yes	Sun	Yes	Round Crown	Accent	Yes	Yes	Foothills below 4,000 ft.
<i>Cornus stolonifera</i> Redtwig Dogwood	D	15' x 15'	Showy	Yes	Part Shade		Round Crown	Accent	Yes	Yes	Moist Places Northern California
<i>Dendromecon rigida</i> Bush Poppy	E	8' x 8'	Showy	No	Sun	Yes	Upright	General Massing	Yes	Yes	Dry Foothills
<i>Dudleya brittonii</i> Chalk Dudleya	Perennial	2' x 1'	Showy	No	Sun	Yes	Upright	Accent	No	Possibly	Southern Coastal Foothills
<i>Elymus condensatus</i> 'Canyon Prince' Giant Wild Rye	Perennial	3' x 3'	Showy	No	Sun/Part Shade	Yes	Mound	Accent	Yes	Yes	San Miguel Island
<i>Encelia californica</i> California Encelia	D	5' x 5'	Showy	Some	Sun	Yes	Mound	General Massing	Yes	Yes	Southern Coastal Foothills and Bluffs
<i>Eriogonum fasciculatum</i> Common Buckwheat	E	3' x 3'	Showy	No	Sun	Yes	Mound	General Massing	Yes	Yes	Southern Coastal Foothills
<i>Fremtiodendron californicum</i> California Flannel Bush	E	15' x 15'	Showy	No	Sun	Yes	Mound	Buffer/Screen	Yes	Yes	Dry Foothills 3,000-6,000 ft.
<i>Fremtiodendron</i> 'Ken Taylor' California Flannel Bush	E	3' x 7'	Showy	No	Sun	Yes	Mound	General Massing	Yes	Yes	Dry Foothills 3,000-6,000 ft.
<i>Galvezia speciosa</i> Island Bush-snapdragon	E	3' x 4'	Showy	No	Sun/Part Shade	Yes	Mound	General Massing	Yes	Yes	Catalina and San Clemente Islands
<i>Garrya elliptica</i> 'James Roof' Coast Silktassel	E	8' x 10'	Very Showy	No	Sun/Part Shade	Yes	Mound	Accent	No	Possibly	Coastal Foothills and Bluffs
<i>Heteromeles arbutifolia</i> Toyon	E	18' x 15'	Showy	No	Sun	Yes	Mound	Buffer/Screen	Yes	No	Southern Coastal Foothills

**SHRUBS**

BOTANICAL NAME COMMON NAME	TYPE Evergreen/ Deciduous	SIZE Height x Spread	ATTRIBUTES Flowers	Fall Color	Sun/ Shade	Drought Tolerant	Shape	Design Application	Nursery Available	Contract Growing	NATIVE LOCATION COMMENTS
<i>Iris douglasiana</i> Pacific Coast Iris	Perennial	18" x 18"	Showy	No	Part Shade	Yes	Upright	Accent	Yes	Yes	Central to Northern Coastal Foothills
<i>Lavatera assurgentiflora</i> California Tree Mallow	E	12' x 12'	Showy	No	Sun	Yes	Mound	Buffer/Screen	Yes	Yes	Channel Islands
<i>Lilium humboldtii ocellatum</i> Humboldt Lily	Bulbs	4' x 4'	Showy	No	Part Shade		Upright	Accent	No	Possibly	Sierra Nevada Woodlands
<i>Lilium pardalinum</i> Leopard Lily	Bulbs	5' x 4'	Showy	No	Part Shade		Upright	Accent	No	Possibly	California
<i>Lupinus albus</i> Silver Lupine	E	4' x 5'	Showy	No	Sun	Yes	Upright	General Massing	Yes	Yes	Southern Coastal Foothills and Sierra Foothills
<i>Mahonia aquifolium</i> Oregon Grape	E	5' x 4'	Showy	No	Sun/Part Shade	Yes	Mound	General Massing	Yes	Yes	Northern Coastal Ranges
<i>Mahonia nevinii</i> Nevin Mahonia	E	10' x 10'	Showy	No	Sun	Yes	Mound	Buffer/Screen	Yes	Yes	Southern Foothills
<i>Mahonia pinnata</i> California Grape	E	4' x 4'	Showy	No	Sun	Yes	Mound	General Massing	No	Possibly	Northern Coastal Ranges
<i>Mimulus hybrids</i> (Verity hybrids) Monkey Flower	E	2' x 3'	Showy	No	Varies	Varies	Upright	Accent	Yes	Yes	California
<i>Muhlenbergia rigens</i> Deer Grass	Perennial	2' x 2'	Inconspicuous	No	Sun	Yes	Mound	Accent	Yes	Yes	Southern Sandy Washes
<i>Penstemon centranthifolius</i> Scarlet Bugler	E	2' x 3'	Showy	No	Sun	Yes	Mound	Accent	Yes	Yes	Foothills and Plains
<i>Penstemon heterophyllus</i> Foothill Penstemon	Perennial	18" x 2'	Showy	No	Sun	Yes	Upright	Accent	Yes	Yes	Southern Foothills
<i>Penstemon spectabilis</i> Showy Penstemon	Perennial	4' x 3'	Showy	No	Sun	Yes	Upright	Accent	Yes	Yes	Southern Coastal Foothills
<i>Philadelphus lewisii</i> Wild Mock Orange	D	3' x 3'	Showy	Some	Sun/Part Shade		Arching	General Massing	Yes	Yes	California
<i>Prunus ilicifolia</i> Hollyleaf Cherry	E	20' x 20'	Showy	No	Sun	Yes	Mound	Background	Yes	Yes	Dry Foothills
<i>Rhamnus californica</i> California Coffeeberry	E	8' x 8'	Inconspicuous	No	Sun/Part Shade	Yes	Mound	Background	Yes	Yes	Coastal Foothills
<i>Rhamnus crocea</i> Redberry	E	5' x 5'	Inconspicuous	No	Sun/Part Shade	Yes	Mound	Background	Yes	Yes	Southern Foothills
<i>Rhododendron occidentale</i> Western Azalea	E	8' x 8'	Showy	No			Erect	Background	No	Possibly	Central and Northern Mountains and Foothills
<i>Rhus integrifolia</i> Lemonade Berry	E	8' x 8'	Showy	No	Sun	Yes	Mound	Espalier	Yes	Yes	Southern Coastal Foothills and Channel Islands
<i>Rhus ovata</i> Sugar Bush	E	15' x 20'	Showy	No	Sun	Yes	Mound	General Massing	Yes	Yes	Southern Dry Foothills
<i>Ribes aureum</i> Golden Currant	D	5' x 5'	Showy	Yes	Sun		Upright	General Massing	Yes	Yes	Moist Foothills
<i>Ribes californicum</i> NCN	D	4' x 6'	Showy	Yes	Sun		Arching	General Massing	Yes	Yes	California
<i>Ribes speciosum</i> Fuchsia-flowering Gooseberry	D	6' x 8'	Showy	Yes	Sun		Arching	General Massing	Yes	Yes	Coastal Foothills

SHRUBS

BOTANICAL NAME COMMON NAME	TYPE Evergreen/ Deciduous	SIZE Height x Spread	ATTRIBUTES Flowers	Fall Color	Sun/ Shade	Drought Tolerant	Shape	Design Application	Nursery Available	Contract Growing	NATIVE LOCATION COMMENTS
<i>Ribes speciosum</i> Fuchsia-flowering Gooseberry	D	6' x 8'	Showy	Yes	Sun		Arching	General Massing	Yes	Yes	Coastal Foothills
<i>Romneya coulteri</i> Matilija Poppy	Perennial	8' x 10'	Showy	No	Sun	Yes	Upright	Accent	Yes	Yes	Southern Foothills
<i>Salvia clevelandii</i> Sage	E	4' x 4'	Showy	No	Sun	Yes	Mound	General Massing	Yes	Yes	California
<i>Salvia leucophylla</i> Purple Sage	E	5' x 5'	Showy	No	Sun	Yes	Upright	General Massing	Yes	Yes	Southern Foothills
<i>Salvia spathacea</i> Hummingbird Sage	E	18" x 18"	Showy	No	Sun	Yes	Upright	General Massing	Yes	Yes	Central to Southern Foothills
<i>Sambucus caerulea</i> Elderberry	D	30' x 30'	Showy	Yes	Sun/Part Shade	Yes	Mound	Background	Yes	Yes	Dry Foothills
<i>Sisyrinchium bellum</i> Blue-eyed Grass	Perennial	12" x 12"	Showy	No	Sun/Part Shade	Yes	Upright	Accent	Yes	Yes	Northern to Southern Coastal Ranges
<i>Sisyrinchium californicum</i> Yellow-eyed Grass	Perennial	12" x 12"	Showy	No	Sun/Part Shade		Upright	Accent	Yes	Yes	Northern Coastal Ranges
<i>Styrax officinalis/californicus</i> California Storax	D	8' x 8'	Showy	Some	Sun/Part Shade	Yes	Mound	Background	No	Possibly	Sierra Nevada Foothills
<i>Symphoricarpos albus</i> Common Snowberry	D	4' x 4'	Showy	Yes	Part Shade		Mound	Background	Yes	Yes	California
<i>Trichostema lanatum</i> Woolly Blue Curls	E	3' x 5'	Showy	No	Sun	Yes	Upright	Accent	Yes	Yes	Central to Southern Coastal Ranges
<i>Yucca whipplei</i> Our Lord's Candle	E	4' x 5'	Very Showy	No	Sun	Yes	Upright	Accent	Yes	Yes	Southern Foothills and Coastal Range

GROUNDCOVERS

BOTANICAL NAME	TYPE Evergreen/ Deciduous	SIZE Height x Spread	ATTRIBUTES Flowers	Fall Color	Sun/ Shade	Drought Tolerant	Shape	Design Application	Nursery Available	Contract Growing	NATIVE LOCATION COMMENTS
<i>Arctostaphylos edmundsii</i> 'Carmel Sur' Little Sur Manzanita	E	1' x 5'	Inconspicuous	No	Sun	Yes	Carpet	General Massing	Yes	Yes	Monterey County
<i>Arctostaphylos edmundsii</i> 'Emerald Carpet' Little Sur Manzanita	E	18" x 12'	Inconspicuous	No	Sun	Yes	Carpet	General Massing	Yes	Yes	Monterey County
<i>Arctostaphylos uva-ursi</i> 'Point Reyes' BearBerry	E	12" x 15'	Showy	Some	Sun	Yes	Carpet	General Massing	Yes	Yes	Northern Coastal Foothills
<i>Aristolochia californica</i> California Dutchman's Pipe	D	1' x 12'	Showy	Some	Part Shade		Climbing	Vine	Yes	Yes	Northern Coastal Ranges and Sierra Nevada Foothills
<i>Armeria maritima</i> Sea Pink	Perennial	12" x 18"	Showy	No	Part Shade		Mound	Accent	Yes	Yes	Central to Northern Coastal Bluffs
<i>Artemisia californica</i> 'Montara' California Sagebrush	E	18" x 4'	Inconspicuous	No	Sun	Yes	Carpet	General Massing	Yes	Yes	San Mateo County
<i>Asarum caudatum</i> Wild Ginger	Perennial	9" x 12"	Showy	No	Shade		Carpet	General Massing	No	Possibly	Central to Northern Coastal Ranges
<i>Baccharis pilularis</i> 'Pigeon Point' Coyote Brush	E	2' x 8'	Inconspicuous	No	Sun	Yes	Mound	General Massing	Yes	Yes	Coastal Foothills



GROUNDCOVERS											
BOTANICAL NAME	TYPE	SIZE	ATTRIBUTES								NATIVE LOCATION
	Evergreen/ Deciduous	Height x Spread	Flowers	Fall Color	Sun/ Shade	Drought Tolerant	Shape	Design Application	Nursery Available	Contract Growing	COMMENTS
<i>Ceanothus gloriosus</i> Point Reyes Ceanothus	E	18" x 8'	Showy	No	Sun	Yes	Carpet	General Massing	Yes	Yes	Central to Northern Coastal Foothills
<i>Ceanothus griseus</i> 'Yankee Point'	E	2' x 10'	Showy	No	Sun	Yes	Carpet	General Massing	Yes	Yes	Coastal Foothills
<i>Ceanothus</i> <i>Clematis ligusticifolia</i> NCN	D	1' x 20'	Showy	Some	Sun/Part Shade		Climbing	Vine	Yes	Yes	Throughout West including California
<i>Epilobium californica</i> California Fuchsia	Perennial	1' x 3'	Showy	No	Sun	Yes	Carpet	General Massing	Yes	Yes	Southern Coastal Foothills and Bluffs
<i>Erigeron glaucus</i> Beach Aster	Perennial	12" x 12"	Showy	No	Part Shade		Mound	Accent	Yes	Yes	Coastal Bluffs
<i>Eriogonum fasciculatum</i> 'Theodore Payne'	E	18" x 3'	Showy	No	Sun	Yes	Carpet	General Massing	Yes	Yes	Southern Coastal Foothills
Common Buckwheat <i>Eschscholzia californica</i> California Poppy	Annual	12" x 12"	Showy	No	Sun	Yes	Upright	Accent	Yes	Yes	Coastal Foothills and Bluffs
<i>Heuchera maxima</i> Island Alum Root	Perennial	18" x 18"	Showy	No	Sun/Part Shade		Upright	General Massing	Yes	Yes	Channel Islands
<i>Keckiella cordifolia</i> NCN	E	3' x 6'	Showy	No	Sun/Part Shade		Climbing	General Massing	Yes	Yes	California
<i>Mahonia repens</i> Creeping Mahonia	E	12" x 3'	Showy	No	Part Shade	Yes	Carpet	General Massing	Yes	Yes	Northern Mountain Ranges
<i>Rhamnus californica</i> 'Sea View'	E	18" x 3'	Inconspicuous	No	Sun/Part Shade	Yes	Carpet	General Massing	Yes	Yes	Coastal Foothills
California Coffeeberry <i>Ribes viburnifolium</i> Evergreen Currant	D	3' x 12'	Showy	Yes	Part Shade		Upright	General Massing	Yes	Yes	Santa Catalina Island
<i>Sidalcea malviflora</i> Checkerbloom	Perennial	2' x 2'	Showy	No	Sun		Carpet	General Massing	Yes	Yes	California
<i>Stipa pulchra</i> Purple Needle Grass	Perennial	12" x 12"	Showy	Yes	Sun		Carpet	Accent	Yes	Yes	Central Valley and Foothills
<i>Vancouveria hexandra</i> NCN	Perennial	12" x 12"	Showy	Some	Part Shade		Carpet	General Massing	No	Possibly	Northern Coastal Forests
<i>Vancouveria planipetala</i> Inside-out Flower	Perennial	2' x 2'	Showy	Some	Part Shade		Carpet	General Massing	No	Possibly	Northern Coastal Forests

**NASA Research Park Design Guide - Alternate Non-CA Native Street Tree Selections**  
All non-California native plant material is subject to the approval of NASA's Design Review Board and Environmental Services Office.

STREET TREE ALTERNATES											
BOTANICAL NAME	TYPE	SIZE	ATTRIBUTES								NATIVE LOCATION
COMMON NAME	Evergreen/ Deciduous	Height x Spread	Flowers	Fall Color	Sun/ Shade	Drought Tolerant	Shape	Design Application	Nursery Available	Contract Growing	COMMENTS
<i>Eucalyptus nicholii</i> Nichol's Willow-Leafed Peppermint	E	40' x 40'	Showy	No	Sun	Yes	Weeping	Manila Drive	Yes	Yes	Australia Fast Growing
<i>Koeleruteria paniculata</i> Golden Rain Tree	D	30' x 40'	Showy	Yes	Sun	Yes	Round Crown	Ellis Street	Yes	Yes	China Needs regular water when young
<i>Liquidambar styraciflua</i> American Sweet Gum	D	50' x 25'	Inconspicuous	Yes	Sun		Conical	McCord Avenue	Yes	Yes	Eastern United States Showy fall color
<i>Platanus acerifolia</i> London Plane Tree	D	70' x 40'	Inconspicuous	Yes	Sun		Round Crown	Ellis/Cody Road	Yes	Yes	Europe More formal and cleaner looking than Western Sycamore
<i>Rhus lancea</i> African Sumac	E	25' x 25'	Inconspicuous	No	Sun		Round Crown	Small Streets	Yes	Yes	Africa Hardy small tree
<i>Schinus terebinthifolius</i> Brazilian Pepper Tree	E	50' x 50'	Inconspicuous	No	Sun	Yes	Round Crown	S. Macon Road	Yes	Yes	Brazil Red berries are very showy

# HARDSCAPE MATERIALS

## ***Paving Systems***

In general, paved areas should be minimized to increase rainwater infiltration and thus decrease storm water runoff. All paving materials outside the public ROW shall be subject to approval by the NASA Architectural and Planning Design Review Boards. However, in areas of high use, such as the Town Center and Hangar One plaza, the use of accent paving materials is desirable. Entry forecourt to major buildings, crosswalks and gateways also warrant a higher quality surface.

- Recommended special paving types include natural stone, tile, brick, and higher quality precast concrete pavers.
- Areas that receive a high level of foot traffic or require emergency vehicles should be of sufficient strength and rough textured/skid resistant finish.
- Plazas should avoid the use of more than three types of special paving and be compatible with the adjoining architecture (where appropriate).



**Paving Type 'A' – Cast-In-Place Concrete**  
Beige/Tan Color with Light Sandblast Finish and Sawn Joints  
Application: General Sidewalks



**Paving Type 'B' – 5"x5" Split Top Granite Insets**  
Beige/Tan Color with 3/4" Mortar Joints  
Application: Street Median Banding Along Curbs



**Paving Type 'C' – 18"x18" Precast Concrete Pavers**  
Tan/Cream Color with light exposed aggregate texture  
Application: Field Paving for Ellis Street and McCord Avenue Extensions



**Paving Type 'D' – 18"x24" Granite Pavers**  
Red/Brown Color with Thermal Top and Split Edge Finish  
Application: Accent Band Paving for Ellis Street and McCord Avenue Extensions





**Paving Type 'E' – 24"x24" Limestone Pavers**  
Beige/Brown Color with Thermal Finish  
Application: Accent Field Paving for McCord Avenue Extensions

Show are the recommended paving materials for the major public ROWs. These special paving materials are selected to provide a cohesive materials palette throughout the public ROW. Each paving type is crossed-referenced for location to the street plan enlargements in the *Streetscape* chapter.

***Walls and Fences***

The use of walls and fences at the NASA Research Park are to be more for screening and accent purposes, rather than separating areas of topographical relief or for security. They should be of high quality materials reflecting the same attention to detail as the site architecture.

- Walls over 3 feet in height are discouraged unless necessary for site screening purposes.
- Masonry walls are desirable and the color and treatment of the wall surface should be compatible with the adjoining building and paving (where appropriate).
- Walls should have a cap and base element and exhibit relief and shadow, rather than be one contiguous surface.
- Fences should be metal or similar and display

decorative or ornamental features within the design. Finishes should reflect a dark color.

***Trellises and Arbors***

Structures to help define walkways, provide shade, and provide vertical accents are encouraged. In some cases, these elements may be an extension of the building or be freestanding.

- Trellises and arbors can be made of stone, wood, concrete or metal or combinations of those materials depending on the function, location, and scale of the structure. In general, a maximum of three materials should be used and less is encouraged. Wood elements are to be left in their natural color, protected with a clear finish. Metal elements should be painted. All materials selected should relate to adjoining building materials where appropriate.
- California Native plant materials that can climb around columns and provide overhead canopies are desirable to provide interest and shade.

# LIGHTING AND SITE FURNISHINGS

## Introduction

All of the elements added to the exterior environment such as bollards, light standards and fixtures, bus shelters, trash receptacles, bike racks, benches, information kiosks, etc. should be of a similar design vocabulary. The specific site furnishing recommendations proposed herein are for the public right-of-ways (ROW) within the NASA Research Park (NRP). Site furnishings for the individual campuses shall be subject to approval by the NASA Architectural and Planning Design Review Boards during design development; however, all site furnishings within the NRP, public and private, shall follow the general goals and guidelines outlined in this chapter.

## Goals

- Materials should be durable, aesthetically appealing, and of high quality to preserve the streetscape integrity.
- Site furnishings should be constructed out of recycled materials where feasible.
- The elements should be in keeping with the

surrounding character of adjacent building materials. Finishes for site furniture should reflect those for walls, fences, and other landscape elements described herein to ensure consistency.

- The elements should be in scale with their surroundings. Elements too big to allow free pedestrian flow, or small enough to become unrecognizable obstacles, are not good uses of limited streetscape space.
- Selected materials need to be sturdy to withstand the rigors of the outdoor environment. The materials chosen need to wear well, retain aesthetic interest, and undergo periodic maintenance.
- Multiple themes should be avoided in the design of site furnishings; however, there should be some compatibility with those elements used in the Historic District.
- All elements should be either fastened solidly to the pavement and/or heavy enough to lessen the chance of theft.
- All elements should allow a free flow of pedestrian traffic, offer clear sight lines, and not

pose a hazard to anyone using the street or sidewalks.

- Simple elements with highlights of color and/or texture are preferable to complicated, overworked elements that call attention to them rather than complement their surroundings.

## Light Standards and Fixtures

The basic intent for lighting throughout the NASA Research Park (NRP) is to provide necessary lighting for safety and orientation or way finding while minimizing maintenance. However, it is also an opportunity to reinforce the concept goals of order, compatibility and energy conservation.

- Outdoor lighting shall include cutoff lighting fixtures that direct a percentage of all light emitted below the horizontal to reduce light pollution. The standard rating system, as per the Illumination Engineering Society of North America (IESNA), is the percentage of light direct below the horizon as follows: (1) Full

Cutoff fixtures - 100%, (2) Cutoff fixtures – 97.5%, and (3) Semi-Cutoff – 95%. All outdoor lighting proposed in the NRP should be Full Cutoff or Cutoff fixtures. The NASA Design Review Board shall approve any proposed exceptions.

- Illumination levels of areas adjacent to the Burrowing Owl Preserve and airport should be minimized to avoid excessive glare.
- Parking lot lighting and other areas not requiring true color rendering shall use low-pressure sodium light sources to improve efficiency and avoid light interference with astronomers' telescopes.
- Outdoor areas of the NRP requiring the quality of true color rendering at night, such as ceremonial plazas, streets, signs, etc., shall use metal halide light sources rather than the less efficient incandescent and mercury vapor lights.
- All light standards and fixtures should conform to the Illumination Engineering Society of North America (IESNA) lighting guidelines for minimum/maximum footcandle requirements

and uniformity ratios to provide continuous illumination levels for safe night visibility. Use no more light than is necessary.

In the public ROW there are two different lighting treatments: (1) Street Lighting and (2) Pedestrian/ Plaza Lighting. Each of these treatments requires a different light standard and fixture. The recommended light standards and fixtures for the public ROW are listed below.

**Street Lighting**

The street lighting will differ depending on the level of traffic on any given street. Primary streets, like the Ellis Street Extension with heavier traffic (both vehicular and pedestrian) will demand a higher level of light as compared to the residential type streets, such as Bailey Road. Gateways, parking lot entrances, and entrance signage locations should also receive a brighter lighting treatment to promote way finding.

The recommended light standard and pole spacing for each street is graphically referenced by “TYPE” in

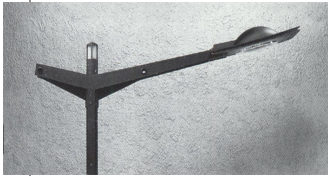
the *Streetscape* chapter's street sections and plan views.

**Pedestrian Lighting**

Dedicated pedestrian walkways with the public ROW will require lighting to promote usage. The lights in this area should provide enough light to create a feeling of personal comfort but not too bright to degrade the eyes ability to adjust to areas of no lamps.

The recommended pedestrian light standard and pole spacing for each street is graphically referenced by “TYPE” in the *Streetscape* chapter's street sections and plan views. Pedestrian light standards recommended elsewhere, such as plazas and campus quads, are described below.

Street Lighting



**TYPE - I**  
**Application:** Street lighting for Ellis Street Extension and McCord Avenue Extension  
**Manufacturer:** HessAmerica  
**Model:** Corona C0550 Single Mount  
**Pole Height:** 30 feet  
**Cutoff Type:** Cutoff



**TYPE - III**  
**Application:** Street lighting for Cody Road  
**Manufacturer:** Lumec-Schreder  
**Model:** Citea Series CTM-STR35-CTP-2 (single mast)  
**Pole Height:** 28 feet  
**Cutoff Type:** Full-Cutoff



**TYPE - IV**  
**Application:** Street lighting for Manila Drive, South Macon Road, Dailey Road, Bailey Road, and Wescoat Road  
**Manufacturer:** Bega  
**Model:** 9998MH  
**Pole Height:** 12 feet  
**Cutoff Type:** Full-Cutoff

Pedestrian Lighting



**TYPE - II**  
**Application:** Pedestrian sidewalk lighting for Ellis Street Extension  
**Manufacturer:** HessAmerica  
**Model:** Sirius SL450-A  
**Pole Height:** 15 feet  
**Cutoff Type:** Full-Cutoff



**TYPE - IV**  
**Application:** Street lighting for Manila Drive, South Macon Road, Dailey Road, Bailey Road, and Wescoat Road  
**Manufacturer:** Bega  
**Model:** 9998MH  
**Pole Height:** 12 feet  
**Cutoff Type:** Full-Cutoff



**TYPE - V**  
**Application:** Special pedestrian lighting for the ceremonial plazas, etc.(i.e. Town Center)  
**Manufacturer:** Architectural Area Lighting  
**Model:** SL VT Largent H-Series  
**Pole Height:** 12 feet  
**Cutoff Type:** Full-Cutoff



**TYPE - VI**  
**Application:** Bollard lighting for the ceremonial plazas, etc. (i.e. Town Center)  
**Manufacturer:** Architectural Area Lighting  
**Model:** Trento TR900  
**Bollard Height:** 35.4 inches  
**Cutoff Type:** Cutoff



**TYPE - VII**  
**Application:** Bollard lighting for the ceremonial plazas, etc.(i.e. Town Center)  
**Manufacturer:** Gardco Lighting  
**Model:** Bollard 10 BR 162  
**Bollard Height:** 42.0 inches  
**Cutoff Type:** Full-Cutoff

Benches



**Application:** Seating  
**Manufacturer:** Landscapeforms  
**Model:** Arcata  
**Materials:** 90% Recycled Polyethylene Slats & Tubular Steel Frame



**Application:** Seating  
**Manufacturer:** Landscapeforms  
**Model:** Petoskey  
**Materials:** 90% Recycled Polyethylene Slats & Tubular Steel Frame



**Application:** Seating  
**Manufacturer:** Landscapeforms  
**Model:** Plainwell  
**Materials:** 90% Recycled Aluminum Slats & Tubular Steel Frame

Trash Receptacles



**Application:** Trash disposal & Ash Urn  
**Manufacturer:** Landscapeforms  
**Model:** Radial  
**Materials:** 90% Recycled Polyethylene



**Application:** Trash disposal & Ash Urn  
**Manufacturer:** Landscapeforms  
**Model:** Radial  
**Materials:** 90% Recycled Aluminum



**Application:** Ash Urn & Optional Trash disposal  
**Manufacturer:** Landscapeforms  
**Model:** Napoleon  
**Materials:** 90% Recycled Aluminum

Bicycle Racks



**Application:** Bicycle parking  
**Manufacturer:** Columbia Cascade Co.  
**Model:** 2178-01-P-C "Cyclist"  
**Materials:** Constructed with Recycled Material upon Request



**Application:** Bicycle parking  
**Manufacturer:** Columbia Cascade Co.  
**Model:** 2170-13-P-C  
**Materials:** Constructed with Recycled Material upon Request



## Benches

Benches should be located throughout the NASA Research Park to create a more pedestrian friendly campus.

- Benches should be provided along Ellis Street Extension, McCord Avenue Extension, Cody Road and within ceremonial plazas and campus quads in areas convenient for pedestrians.
- The material should be made from recycled metals and/or polyethylene.
- The finishes on metal should include rust inhibitors and be resistant to UV light, chipping, and flaking. Recycled polyethylene (plastic) should also have UV light inhibitors added to the polyethylene.
- Benches should be black, gray, or silver in color and be capable of being permanently attached to paving or footings to avoid theft.
- All benches used throughout the NRP should be modern in character and have a “high-tech” aesthetic.

## Trash Receptacles and Ash Urns

Trash receptacles and ash urns should be located throughout the project in easily accessible locations, i.e. ceremonial plazas, campus quads, and along pedestrian accessible streets.

- Trash receptacles should be chosen for durability, functionality that conceals the trash and reduces animal scavenging.
- The material should be made from recycled metals and/or polyethylene.
- The finishes on metal should include rust inhibitors and be resistant to UV light, chipping, and flaking. Recycled polyethylene (plastic) should also have UV light inhibitors added to the polyethylene.
- The use of recycling receptacles for glass and aluminum refuse is encouraged; however, these receptacles should match the design and character of the other trash receptacles.

## Bicycle Racks

Bicycle racks should be located appropriately throughout the NRP to encourage alternative modes of transportation.

- Bicycle racks should be located at (1) the Transit Green light rail station, (2) along McCord Avenue Extension for easy access to retail establishments, and (3) adjacent to residential and University building entrances.
- The material should be made from recycled metals.
- Covered bicycle storage areas should be located at the light rail station.
- Bicycle racks should be located in well-lit areas and be easily accessible.
- The bicycle racks should match the design vocabulary of the other site furnishing elements and be anchored to the pavement or footings.



*Tolar, Inc.*  
Simple use of prefabricated parts can create an interesting bus structure.



*LandscapeForms, Inc.*  
A delicate structure can give an appearance of lightness.



*Museum of Modern Art (MOMA), San Francisco*  
The glass canopy gives this bus stop a modern feel.

## Bus/Shuttle Shelters

Bus or shuttle structures should reflect the general character and design as generally described for buildings in the Building Design chapters. The final design of the shelters will need to be coordinated with participating transit agencies if appropriate, in order to ensure adequate stopping space.

- They should be scaled appropriately to the pedestrian, provide shelter, and seating.
- Bus shelters shall be located within the ROW, and located at the Transit Green, and at locations of high pedestrian use along Ellis Street Extension, Cody Road, Severyns Avenue, and McCord Avenue Extension.
- Shelter locations should be well lit and signed for visibility and safety and have adequate access for persons with disabilities.

# PUBLIC ART AND WATER FEATURES

## Public Art

Public art is encouraged throughout the NASA Research Park. All proposed Federal buildings, such as the Carl Sagan Center, are required to integrate art into the architecture as per the federal Art in Architecture Program administered by the General Services Administration's Public Buildings Service (PBS). Through the Federal program, artists are commissioned to create works of art for new or substantially renovated Federal buildings and U.S. Courthouses. All Federal buildings proposed at the NASA Research Park should follow the PBS program.

Although the private entities (partners) at NASA Research Park are not required by federal law to commission public art, it is nonetheless recommended. Works of art should be integrated into the building architecture and adjacent plazas and the surrounding landscape. The NASA Research Park Architectural Review Board should direct the commissioning of art for these buildings and landscapes.



*Henry Moore, Three-Piece Reclining Figure. MIT, Cambridge, MA  
Outdoor sculpture within a green open space.*



*Alexander Calder, La Grande Voile. MIT, Cambridge, MA  
Public art, at a different scale, can be added to large courtyards.*

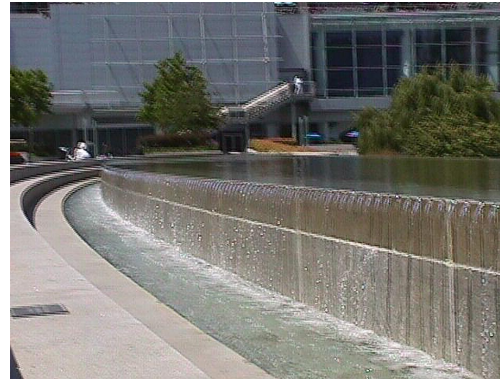


*Sidney Walton Park, San Francisco, CA  
Sculpture with water feature creates a pleasant seating area.*

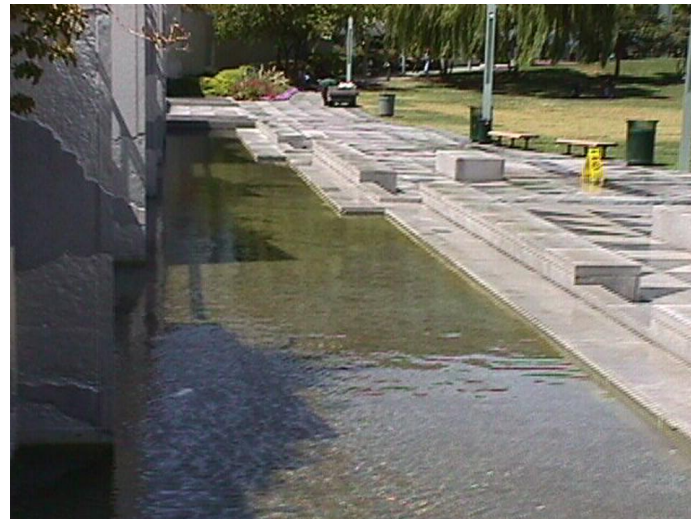




*Martha Schwartz, Inc. Exchange Square, Manchester, UK  
Creative solutions that incorporate sculptural qualities  
with water is encouraged.*



*Yerba Buena Gardens, San Francisco, CA  
Running water creates “white noise” that eliminates  
unwanted sounds.*



*Yerba Buena Gardens, San Francisco, CA  
Water features should be coordinated with site furniture.*

## Water Features

Water features, such as fountains, ponds, and streams, should be implemented only in areas that receive high levels of pedestrian activity or visual prominence (i.e. Town Center, Hangar One Plaza, and campus quads).

## Guidelines

- Water features shall use reclaimed water and be designed as a closed system (recycling of water).
- Water loss should be minimized—avoid large spray jets and windy areas.
- If applicable, adjacent plant material should be California native evergreen to reduce leaf litter maintenance issues.

# SIGNAGE

The following guidelines are general standards that apply to all developments within the NRP. The NASA Architectural and Planning Design Review Boards may require the submission of a uniform signage program in conjunction with an owner participation agreement. The NASA Review Boards, as part of the design review process, will review building signage.

- No billboards are permitted.
- No general advertising signs are permitted in the public right-of-way.
- Flashing signs, moving signs, and rooftop signs are not permitted.
- No business signs are permitted above the base height of the building.
- All exterior signage lights shall be turned off after business hours.

The following NRP signage design principles should be used as a framework for generating a more detailed signage program prior to implementation. The design principles can be grouped into four categories, (1) regulatory, (2) directional, (3), informational and (4) identification.

- Regulatory signs help to direct and inform the motorist. Standard signs such as stop signs, one-way, disabled access, etc., should be used to clearly communicate safe traffic flow and parking restrictions.
- Directional signs help orient and direct users through the site. Directional signs should be located at intersections or other circulation nodes that have multiple destinations. Directional signs can be used for the vehicle and the pedestrian realm. These signs should be designed with appropriate typography size and consistent material type. The location of directional signs is important to insure that the relevant information is communicated at the appropriate time during the way-finding process.
- Informational signs are useful for providing descriptive information about the site, such as the burrowing owl habitat and/or research center maps and directories. Informational signs should be implemented on primary pedestrian routes of travel as appropriate.
- Identification signs should be used to acknowledge specific uses or functions within



*Regulatory signs*





*Directional sign*



*Informational sign*



*Directional sign*



*Identification sign*

the research center. Identification of buildings, research facilities, etc. should be clearly signed. Identification signs should be used on or near all buildings generally located by the primary entrance to that building. These signs should be clearly visible to visiting patrons and should be lit at night. The descriptive information on these signs should be consistent with the directional and informational signs previously discussed.

# INFRASTRUCTURE

## Parking

The NASA Research Park encourages the use of public transportation to minimize traffic in and around the Research Park area. Bicycling and walking are encouraged within the Park by incorporating bicycle storage spaces and safe and convenient pedestrian pathways.

Parking calculations shall be based on the total aggregate anticipated square footage by building, anticipated TDM impacts, and anticipated opportunities for shared parking. Screening should be provided to reduce the visual impact of parking areas from streets and adjacent buildings. Where parking structures are utilized, they shall be designed as an extension of the overall design concept incorporating similar materials and architectural detailing in such a manner as to mask the intended purpose. Parking located at the light rail station will be configured to address the transit green and light rail station with pedestrian paths between them. Parking at the light rail station will feature ground floor retail such as a coffee shop and newsstand. Parking areas shall be controlled to

collect the parking fee as set by the TDM Program.

Parking access technology shall include card readers or similar technology to automatically reduce the fee for carpools.

- Parking for retail uses shall be screened from pedestrian view.
- Secure-access, covered bicycle parking will be provided at strategic locations on campus. The bicycle structures will be designed in concert with nearby buildings.
- One motorcycle parking space must be provided for every 50 vehicular parking spaces. The stall size shall be 4'-0" in width and 8'-0" in length.
- The required ratio of compact size spaces to standard size spaces is 50%.
- At parking structures, stairs and elevator lobbies should be conveniently located, visually accessible from the building entry, well lit and secure.
- Lighting should be designed for vehicular and personal safety. Nooks, dark areas and other areas without clear sightlines should be minimized.



*International Parking Design Inc., PeopleSoft Inc., Pleasanton, CA  
A variety of materials can add architectural interest to a parking structure.*



*Parking garage, The Gap Inc., San Francisco, CA*



*Parking Structure, South Carolina*

*Landscaping should be used to visually screen parking garages from the roadway and adjacent buildings, and to allow for local infiltration of stormwater runoff.*

- Light spillage from fixtures should be controlled to avoid conflicts with surrounding uses.
- Control impacts from vehicle headlights in parking garages on surrounding areas.
- To achieve overall character, material and color of parking structures must be carefully integrated into the architecture and landscape design of the project.
- The minimum size requirement for parking spaces is: compact = 127.5 SF, standard = 160 SF.
- One-way and two-way parking configurations shall have 90-degree orientation.
- Handicap accessible parking requirements shall be provided in accordance with Americans with Disabilities Act (ADA).
- All motor vehicles shall be screened from public view.
- Parallel parking spaces shall be limited in order to maintain a minimum ROW.
- Parking surface shall divert rainwater runoff into planter boxes (structured parking), landscaped areas, or other retention areas such as swales or small ponds.

TOTAL SPACES	Required Accessible Spaces
1 - 25 Spaces	1 Space
26 - 50 Spaces	2 Space
51 - 75 Spaces	3 Space
76 - 100 Spaces	4 Space
101 - 150 Spaces	5 Space
151 - 200 Spaces	6 Space
201 - 300 Spaces	7 Space
301 - 400 Spaces	8 Space
401 - 500 Spaces	9 Space
501 - 1000 Spaces	2 % Total
1001 and over	20 plus 1 for each 100 over 1000

ADA Table: Refer to ADA Code of Federal Regulations for possible changes.

## Utilities

- Traffic signal boxes, transformers, telephone switching boxes and other utility structures should be located underground or be screened with landscaping.
- Fire hydrants should be highly visible and free of screening. The style of the hydrant connections shall be uniform throughout Moffett Field.
- Transmission lines, such as power and telephone, shall be underground for all new construction.
- Wastewater and water lines shall be located in the public right-of-way or street setback so not to obstruct existing or future building sites.

Depth of utilities should be as follows:

- Electrical and communications ducts should be located 18" below grade to the top of the duct.
- Storm drain lines should be located 24" below grade to the top of the pipe.
- Water and gas lines should be located 30" below grade to the top of the pipe.
- Sanitary sewer lines should be located 36" below grade to the top of the pipe.

## Draining and Grading

Storm drainage systems in the urban areas should consist of curbs, gutters and underground piping to Moffett Field's oil separators and retention ponds. Streets in rural areas should have a drainage swale to allow drainage of the street. If the swale is landscaped, it should be designed with a steel bottom to allow complete drainage.

Grading for development shall be limited to slab on grade foundations, with limited excavation for features such as elevator pits.





# BUILDING DESIGN

# OVERALL DESIGN STRATEGY

The intent of the building character design guidelines are primarily to define a palette for architectural design at the NASA Research Park, to provide architects and engineers guidance in solving design problems, and to provide a baseline for evaluating proposed design solutions.

The NASA Ames Research Center has, as a result of incremental planning and development since the 1930's, developed a significant diversity of architectural forms and materials. Within this diversity, however, the historic core of the NASA Ames Research Center, Shenandoah Plaza, has a strong visual similarity between structures that is reminiscent of the mission revival style.

The design guideline principles respect and capitalize upon the existing elements found within the NASA Ames Research Center but are designed to be complimentary rather than replicating the existing historic building core, paying special attention to such architectural elements as building massing and form, material selection, color, and texture. The design guidelines shall steer or direct

future development by encouraging continuity of building forms, appropriate building height and scale, responses to climate and energy efficiency, rhythm and façade articulation of building entries, use of unifying materials and color, and building flexibility for future change.

## Significant Buildings

The NASA Research Park will also include special buildings that will provide architectural diversity within the Park. Although they will adhere to the overall aesthetic goals of the Research Park in terms of creating an open campus-like environment, they will be allowed to have a certain amount of architectural freedom. The specific design guidelines for these special buildings will result from consultation with the NRP Design Review Board. Buildings considered to be special include the Carl Sagan Center and The Computer History Museum.

## Skyline Character

Skyline character is a significant component of the overall composition at the NASA Ames Research Center and the guidelines encourage development that will complement the existing pattern and result in new attractive elements when viewed from nearby vantage points.

- Tall building locations should be selected with the recognition that taller buildings in particular, when seen together, will create the skyline character of the NASA Research Park.
- Taller buildings should be located in clusters to establish a distinctive and memorable skyline that reinforces activity and density patterns at the NASA Research Park.
- Recognizing the views of the NASA Ames Research Center from surrounding areas, variety in building heights, massing, and building articulation are recommended to promote visual variety.



# BUILDING MASSING

The massing of a building refers to its bulk, or the volume it occupies on the landscape. The size and proportions of its exterior envelope give it an overall massing character, which may appear bulky or graceful, compatible or incompatible with nearby neighborhoods.

NASA Ames Research Center has several distinct patterns for building massing, each of which prevails in a particular district.

## Bulk

Bulk standards control the length and width of buildings to preserve light penetration and air movement and prevent construction of massive buildings, which inhibit views and generally disrupt the character of the development. The intent is to encourage gracefully designed, articulated buildings.

## Building Base

For pedestrians, the character of the building base is important in establishing a comfortable scale and environment and should be designed to achieve this.

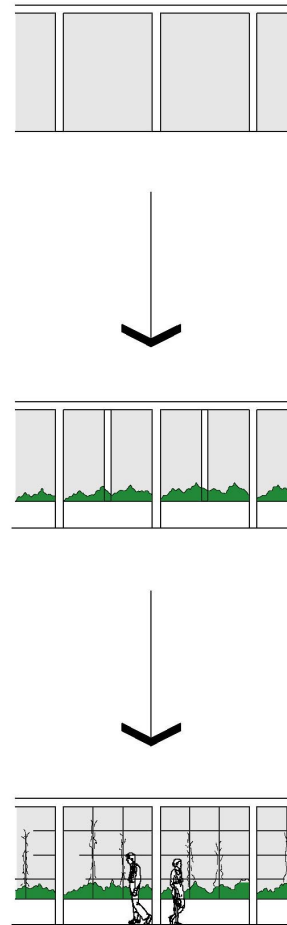
- Variety at street level for pedestrian scale can be achieved through the use of design elements such as stairs, entries, expressed structural elements, arcades, projections, textured materials, and landscaping.
- In the case of taller buildings, setbacks above the tower base should not be so significant that taller building portions have no presence at the ground level.
- Taller portions of buildings should be expressed as elements integrated into the overall design of the structure.

## Coverage and Streetwall

Commercial districts within urban centers are noted for streets with buildings at or near the property line where there is marginal to no space between buildings. This historical pattern of development gives cities their intense urban quality and should be a model for the NASA Research Park development. Streetwall and lot coverage standards are required as follows to maintain a consistent relationship between the building and the street as well as the relationship among all buildings within the NASA Research Park. Minimum and maximum streetwall definition will serve to build strong street definition without creating oppressive building masses.

- Commercial/Institutional buildings should be continuous at the property line on streets, respecting the required setbacks, except for occasional breaks in the streetwall (see *Building Heights and Setbacks* for specific requirements).
- Variations from the streetwall are allowed to





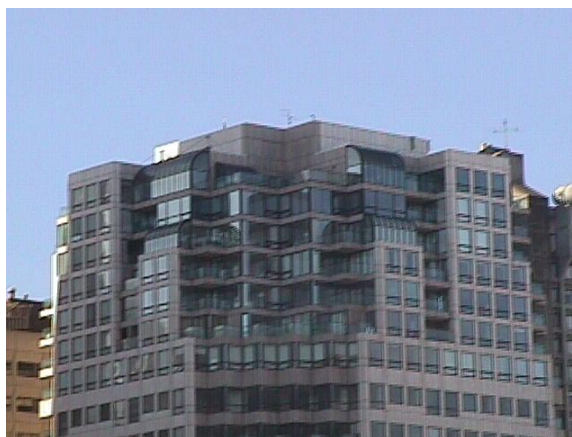
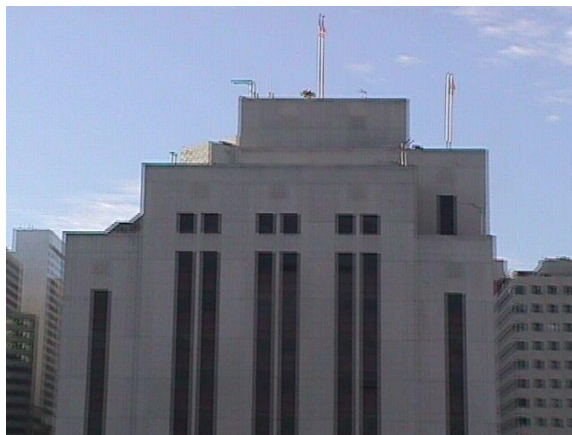
*Diagram of Pedestrian Scale on Blank Walls*

create open space, pedestrian circulation space, mid-block lanes, and landscaped areas. The open spaces created within the streetwall should not be so frequent or close together that they undermine the intention behind the idea of a continuous streetwall.

## Pedestrian Scale

Office, institutional and other commercial buildings are encouraged to be active and to incorporate visually interesting details and/or other types of articulation into the design of the building base.

- Where a substantial length of windowless wall is found to be unavoidable, a contrast in wall treatment, outdoor seating and/or landscaping should be used to enhance visual interest and pedestrian area vitality, thereby eliminating blank walls.



*Various buildings, San Francisco, CA*

*The design of the building should be carried through to the roof, including screening of any mechanical equipment.*



San Francisco, CA  
These buildings have poor roofscape design.

## Roofscape and Mechanical Equipment Screening

Recognizing that the NASA Research Park buildings and their roofs may be visible from surrounding locations, they should be designed consistent with the distinctive architecture of the building.

- Roofs should be constructed of non-reflective, low intensity colors.
- Mechanical equipment should be organized and designed as a component of the roofscape and not appear to be an after-thought or add-on element.
- Solar water heating and/or photovoltaic arrays shall be incorporated into the roof design, where feasible.

## Architectural Details

To mitigate the scale of development and create a pedestrian friendly environment, building massing should be modulated and articulated to create interest and visual variety.

- A number of architectural details such as vertical and horizontal recesses and projections, changes in height, floor levels, roof forms, parapets, cornice treatments, window forms, and location of garage entries, as appropriate to each site can create shadows and texture and add to the character of a building.
- Variety in building heights is encouraged to promote visual interest and modulate the scale of development, particularly along Ellis Street Extension, McCord Avenue Extension, and Cody Road. Strong horizontal and vertical elements also serve to modulate the scale of development and create interesting streetscapes for pedestrians.
- Tall buildings should reflect a typical building pattern of base, shaft, and capital separated by cornices, string or belt courses, setbacks and other articulated design features.

# BUILDING HEIGHTS AND SETBACKS

## Building Height and Form

Variations in building heights, massing and building articulation are encouraged to promote variety and reduce the scale of the development. Architectural details such as vertical and horizontal recesses, projections, changes in height, floor levels, window treatment, roof forms, and location of garage entries, should be used to create shadows and texture and add character to the buildings and the general master plan.

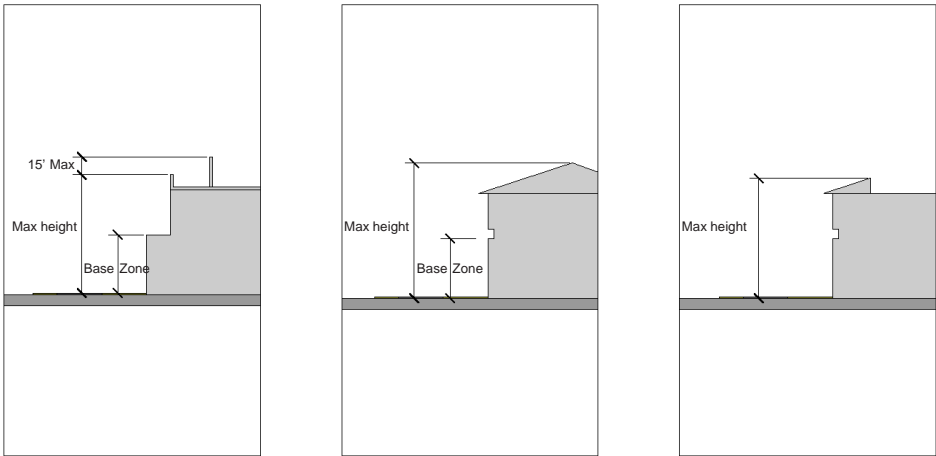
### Height

For the purposes of establishing height limits within the master plan area, height zones are established as generally illustrated on the Height Zone Chart and Height Zone Site Diagram. Refer to the Definition of Terms section for “Building Height” and “Developable Area.” The percentage of developable area at a specified height is calculated per each specific site within a height zone on a block by block basis. Refer to the Historic Resource Protection Plan for specific height restrictions in the Shenandoah Plaza Historic District.



	HZ-1 (1 Story)	HZ-2 (2-3 Story)	HZ-3 (2-3 Story)	HZ-4 (3-4 Story)	HZ-5 (4-5 Story)	HZ-V (varies)
Maximum Height	35'	40'	50'	65'	80'	40-80'
Base Zone	28'	35'	40'	50'	65'	
Maximum percentage of developable area at base	80%	80%	90%	90%	90%	
Penthouse	Mechanical equipment and appurtenances necessary to the operation or maintenance of the building or structure itself (including ventilators, plumbing vent stacks, cooling towers, water tanks, panels or devices for the collection of solar or wind energy, elevator, stair and mechanical penthouses, skylights, and window washing equipment) together with visual screening for any such features are exempt from the height zone restriction. The maximum height for any such mechanical equipment shall not be more than 15' above specified maximum heights, provided that screening is set back from the edge of the building a dimension equal to the height of the screening. All penthouses and appurtenances shall have visual screening. See figure for roof heights.					

Height Zone Chart



Measuring Building Height



## Setbacks

The setback is defined as the distance from the public right-of-way (ROW) to the edge of the building. Setbacks are required to provide space for pedestrian and bike path links and for physical definition of the streetscape, as well as connection to the major open spaces. Setbacks along the primary and secondary streets shall be as indicated in the Setback Diagram and Chart.

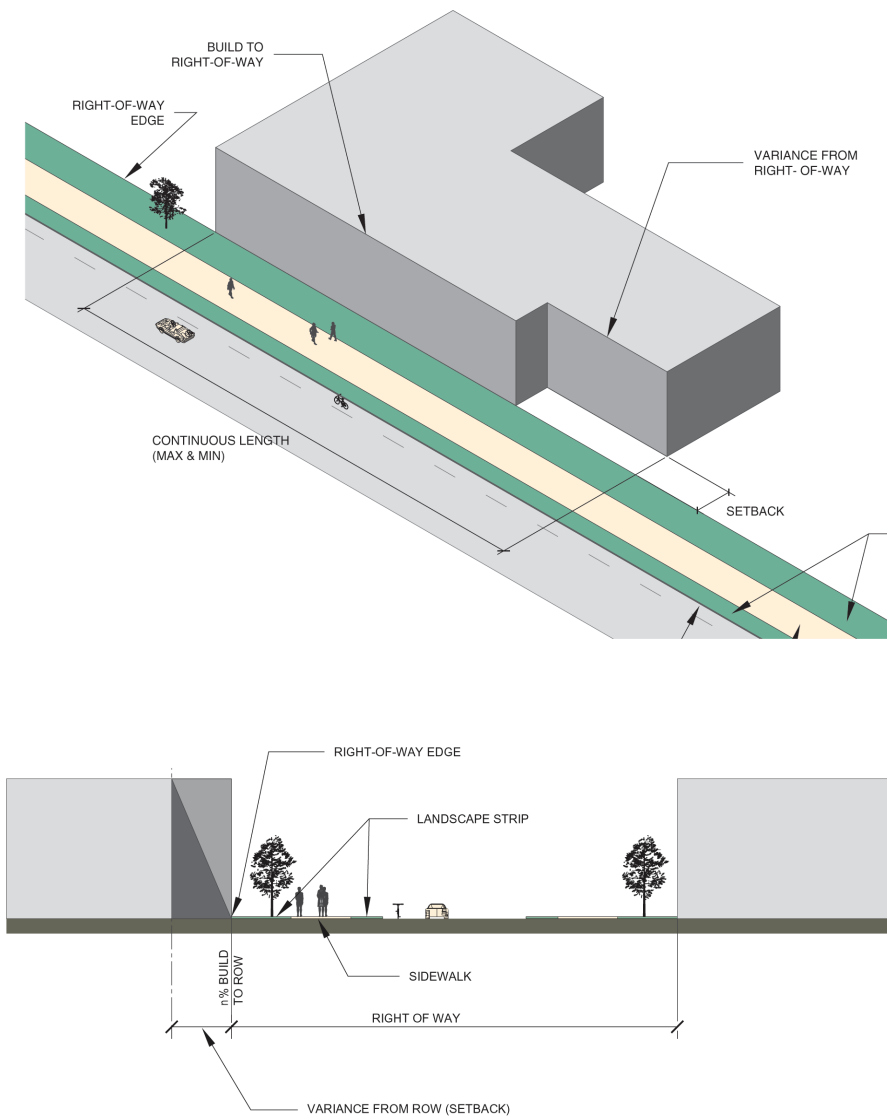


	Small	Medium	Large
Build to Right-of-Way	70%	50%	varies
Variance from Right-of-Way	up to 15 ft	up to 30 ft	varies (i.e. adjacencies to open spaces/parks)
Minimum Length (feet)	110	175	varies
Maximum Continuous Length (feet)	225	275	varies

**\*Notes:**  
Variation within the streetwall frontage is allowed within the setback area. Additional variations may be permitted subject to design review.

Architectural projections over a sidewalk, alley, park, or plaza shall provide a minimum of 10' of vertical clearance from the sidewalk or other surface above which it is situated. Projections of a purely architectural or decorative nature such as cornices, eaves, sills, and belt courses, with a vertical height of no more than 5'-0", not increasing the floor area of the volume of space enclosed by the building, and not projecting more than 3'-0" over sidewalks, alleys, and public open spaces are allowed. Projecting windows, balconies, and similar features shall have a maximum projection of 3'-0" over sidewalks and public open spaces. Additional projections may be permitted subject to design review.

Setback Chart



# MATERIAL AND COLOR

The intention of this section is to establish design concepts needed to create the architecture of the NASA Research Park. Rather than dictating style, the concept of consistent and/or related materials, light in tone, has been selected as a key unifying characteristic. Great buildings of nearly any style and genre have been designed within these parameters. At the same time, mediocre buildings will blend into the overall context of the street frontage, if they are predominately the same color as their neighbors. Creative use of materials and textures, as well as articulated building forms as previously discussed, will allow each building to have an individual presence and character contributing to the building of an architecturally rich campus environment.

Extreme contrasts in materials, colors, shapes and other characteristics that will cause buildings to stand out in excess of their public importance should be avoided. The selection of building materials should be based on the materials' contribution to distinguishing different functions within the campus, as well as climatic conditions, thermal qualities, durability, visual character, and life

cycle cost. Where feasible, recycled materials shall be used in building construction.

- As consistent with the general visual character of Shenandoah Plaza, all buildings should be light in tone, particularly if they are highly visible on the skyline.
- Seventy percent (70%) of the solid wall portions of buildings visible from the public right-of-ways shall be light in tone as defined by the materials listed below. The use of supporting accent materials for the remaining thirty percent (30%) of the exterior wall, appropriately selected to enhance the building design, is encouraged and shall be reviewed by the NASA Design Review Board.
- The selection of the color and materiality of walls not visible from the public right-of-ways, such as the façades facing entirely interior courtyards, is at the discretion of the development team, or may follow university-established guidelines.
- Primary building materials, constituting the majority of a building's exterior, provide the greatest visual impact. Generally, each façade should consist of a single primary material.
- Secondary materials are those that cover smaller, lesser portions of a building's exterior wall surface or appurtenances. These materials most commonly appear as fascia panels, material accents at entries, windowsills, trim and other architectural details. To avoid visual clutter, and to reinforce the effectiveness of an overall architectural composition, a limited palette of secondary materials should be used. They should generally be limited to no more than two secondary materials on building surfaces or design elements, and to no more than three selections for other accessory items.

## Materials

### *Acceptable Primary Building Materials*

- Architectural concrete: finished surface, exposed aggregate, or sand blasted
- Natural Stone: flamed, honed, polished, chiseled, or cleft finish
- Masonry: brick (precast brick and surface applied brick acceptable), terra cotta, tile, glass block, GFRC

### *Acceptable Secondary Building Materials*

- Metal: aluminum, zinc, or, copper (stainless, corrugated or non-corrugated)
- Glass: insulated, clear or tinted, low-e
- Exterior Insulation and Finish Systems (EIFS) or stucco (permitted above the first story and must limit EIFS or Stucco to 30% of building surface)

### *Sustainable Design*

To the maximum extent feasible, use

- Materials with recycled content.
- Materials from sustainable yield harvest.
- Materials from local and regional sources.

### *Acceptable Visible (non-Flat) Roof Materials*

- Metal roofing (painted aluminum, zinc, or copper)
- Tile, Slate, Terra Cotta
- Fabric

### *Non-Visible Roof Materials*

- Allow for use of energy efficient (white or silver) roof materials at or above the third floor (or in areas not visible from the ground or adjacent buildings).

### *Unacceptable Exterior Building Materials*

- Wood: siding, roofing (Architectural woodwork is acceptable for details, window mullions, etc., but not as a primary building material)
- Asphalt, composite shingles, visible rolled roofing

The NASA Design Review Board must review material uses not specified in the list above. It must be noted that although not listed above, the use of reflective or coated glass, on a limited basis, may be

used after board approval. Similarly, the use of specific species of wood such as teak that has been grown in a sustainable manner may be proposed for such uses as doors, window frames, trellises or arbors, and benches, after approval by the NASA Design Review Board. Hardwood from rainforests shall not be used.

### *Materials Application*

When multiple materials are used, heavier façade materials (stone, masonry) should be located at the ground level, and lighter building materials (metal) should be located at upper levels so that the appearance of weight is reinforced. To avoid the appearance of false applique, material changes should not occur at the outside corners of buildings or the middle of walls, unless such changes reflect actual structural differences. Material changes may occur at reverse corners.

### *Glass Curtain Walls*

A building may have a maximum of fifty percent (50%) exterior glass curtain wall, which must be

adjacent on at least one side by concrete, stone, masonry, or metal construction. Reflective glass curtain walls in this Northern California environment introduce glare points that are visually prominent from long distances, and are not encouraged. Specific uses of reflective glass may be proposed as noted above, but must have approval of the NASA Design Review Board.

**Existing Building Relationship**

The NASA Research Park, although a new entity, is part of an existing collection of buildings, some of historic significance, and special attention must be taken with new construction in order to create an environment that is inclusive of the existing context. The intention with the new campus is to compliment the existing historic core and not to imitate styles from the past. Therefore, as previously mentioned, the concept adopted in these guidelines is to relate to the existing buildings by the use of similar materials. New structures that are part of an existing building complex should incorporate at least one exterior material from the existing building's material palette.

**Historic Area**

Buildings in the historic district, including the Clark Road entry sequence and on Wescoat Road, should closely replicate the materials used in the district's older Spanish Colonial Revival buildings. This provides for the use of stucco, cement plaster on masonry, or cement plaster on precast concrete panel construction. Other materials may be suggested, and reviewed by SHPO for approval. Sloped roof forms, encouraged in the district, should be clay tile to match the older buildings. When budgets or other building requirements do not make clay tile feasible, a substitute material with similar appearance and characteristics may be used.

**Color**

In recent years, color as a useful and effective design component has gained greater significance in building design. At the NASA Research Park, color and materials will be used to develop a cohesive thread among the various structures that exist or are planned. Color and materials can have an impact on energy consumption as well. Therefore, the following

principles, strategies and guidelines have been developed regarding the selection and application of architectural colors.

**Color Principles**

- As a unifying element, colors should be limited to a defined palette, and should be developed with the intent of respecting and complementing the existing historic core.
- Color as one of the design tools should be used to add interest, variety, and scale to a building.
- Material colors should respond to their local setting, in terms of value, texture, availability, and reflectivity.
- Color pre-selection must be an integral part of the preliminary design process.



***Color Palette***

The NASA campus has a unique setting at the south end of the San Francisco bay that has not yet been fully utilized nor appreciated in the past. In order to create a more cohesive, visually rich environment, the colors for structures should be selected based on their ability to integrate the structures into the local environment and to relate to the existing context. Working from the following defined palette will achieve this goal.

***Defined Palette***

Colors and materials should reflect the tones and values found in the surrounding local context, as well as the colors of the natural environment. These colors are warm and neutral shades with a few cool tones. Colors should be bright and light with accents that are rich and deep. The color values should be light to medium. Extremely light colors are too reflective and will tend to stand out within the local context while dark colors will tend to be heavy and not play with light and shadow.

***Color Application***

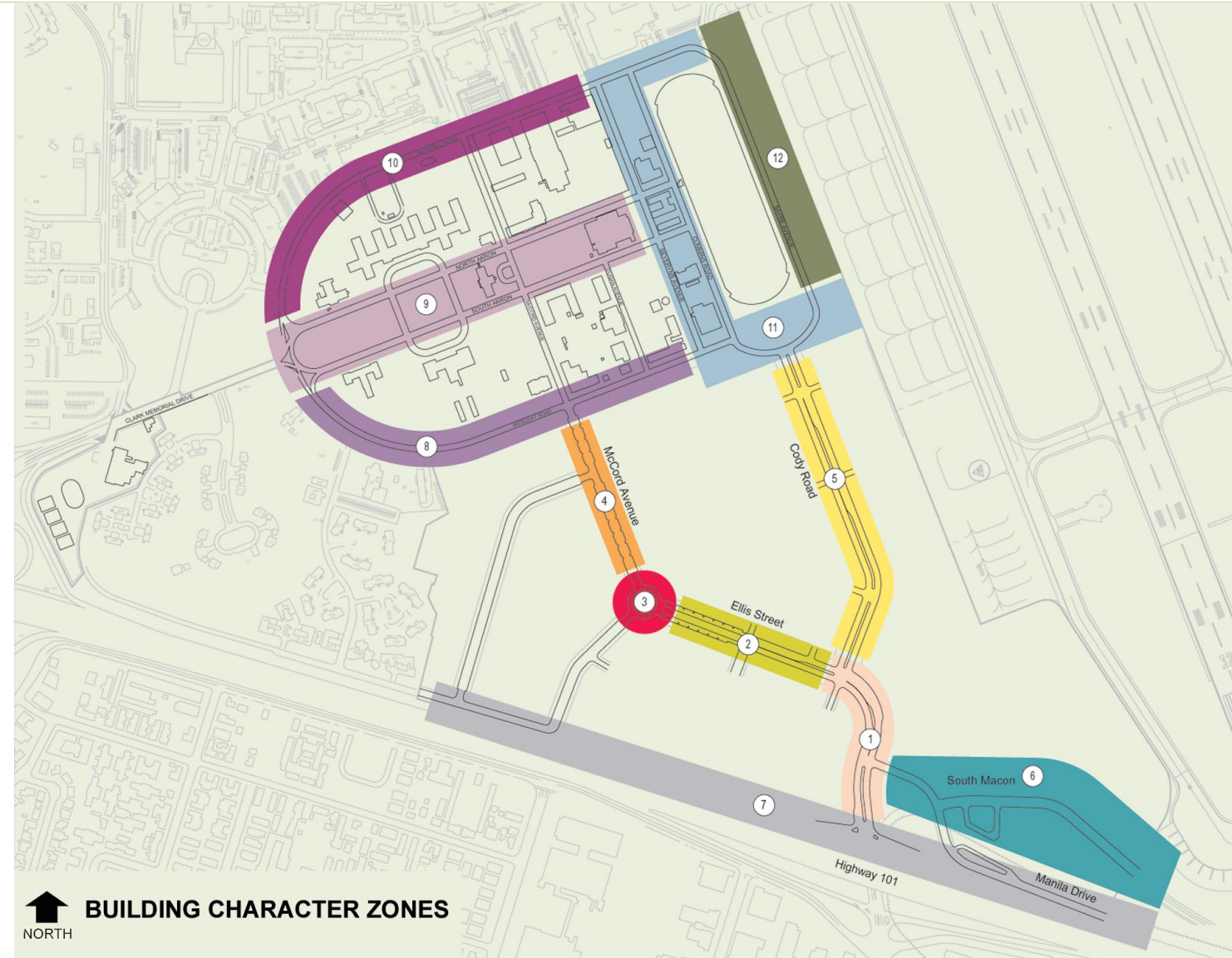
The following are specific guidelines for appropriate color application.

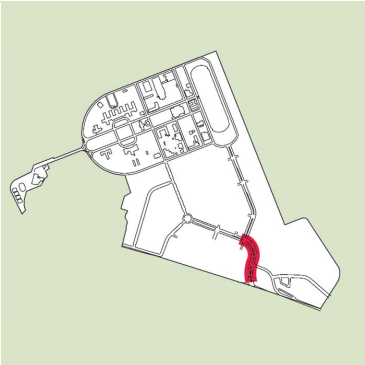
- Darker colors, although limited, work best at the building's base to help anchor the structure to the ground.
- Changes in color should occur at logical places, such as changes in form, massing, materials, or structural changes such as between floors.
- Multiple colors or materials on a building should be used to skillfully add interest and variety.
- If a building has only one material or color, the building design should work to gain visual interest through means of form, massing, or fenestration.
- Color changes should integrate with, or relate to the fenestration pattern.

- Enriched materials should be used at building entries to add human scale and interest, as well as to emphasize their importance and identity.

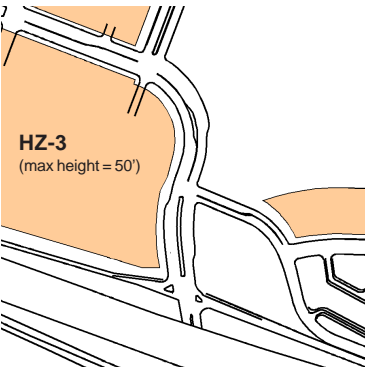
# BUILDING ZONES: COMMERCIAL/INSTITUTIONAL

The purpose of this section is to identify and discuss the character of each zone or major street.

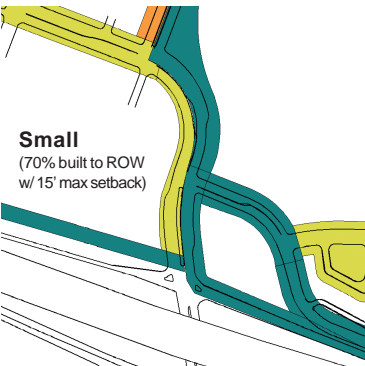




Keymap



Height Zone Diagram



Setback Diagram

## 1 - Entry Arrival Experience: Ellis Street Extension South

This southeast corner of the site marks one of the two primary entrances to the NASA Research Park. It serves primarily as a point of dispersion into the separate areas of the Park. As a result, it is the front door to many partners, including the Lab project, Universities, and Hangar One. It will remain a minimally landscaped area, maintaining large, open views across the Owl Preserve and beyond to the airfield.

Landscape and roadway design will aim to minimize the feeling of wide paved roadway lanes and the impact of automobiles. Furthermore, roadway design will provide safe access for pedestrians and those commuting on bicycle. The visibility of parked cars and garages will also be minimized.

As a major junction, this entry must have clearly marked directional and identity signage. No construction will occur on the eastern side of the

zone, in order to reserve views into the Burrowing Owl Preserve. However, on the western side of Ellis Street Extension, a small setback is encouraged to further define this entry. Buildings located here will have a mid-range height, with a maximum of 50 feet.

### ***Building Uses/Types***

Located on the western side of Ellis Street Extension will be commercial buildings dedicated to research and development. The Transit Green, a small open space, is directly to the east of this southern section of Ellis Street Extension. Further to the east is the Light Rail Station, the major entry point for those using alternative modes of transportation.

## 2 – Ellis Street Extension

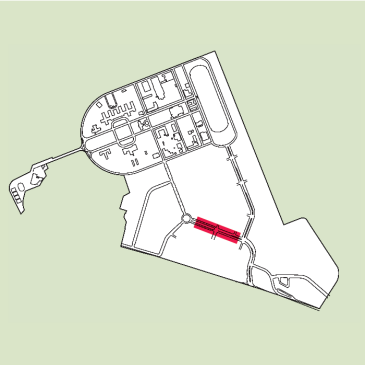
With the majority of the vehicular traffic coming from Highway 101, the second half of Ellis Street Extension becomes a vital transition to the pedestrian-oriented atmosphere of the Town Center and beyond. This double tree-lined road will emphasize pedestrian comfort and safety with its wide sidewalks and designated crossings.

In order to accomplish this transition, the two driving lanes of the first half become single lanes on the second half of this corridor. A large central median appears in which further activity can occur. On-street parking is provided in this section near the Town Center for short-term visitors.

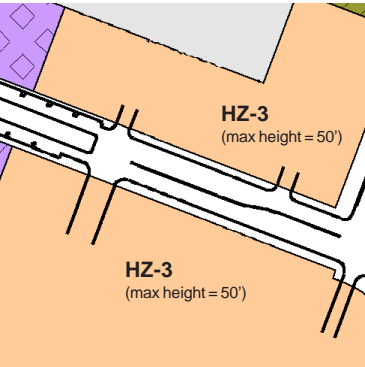
In addition, buildings along this section of Ellis Street Extension require a minimum setback from the ROW. Open spaces between buildings along Ellis Street Extension will connect internal open spaces on both the University and Lab Project areas, and will provide views into the internal landscaped courtyards and pathways.

### *Building Uses/Types*

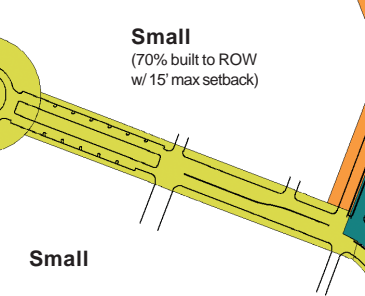
Commercial-use buildings pertaining to the Lab Project will be located south of Ellis Street Extension. The northern edge of the street will be dominated by educational facilities belonging to the University partners.



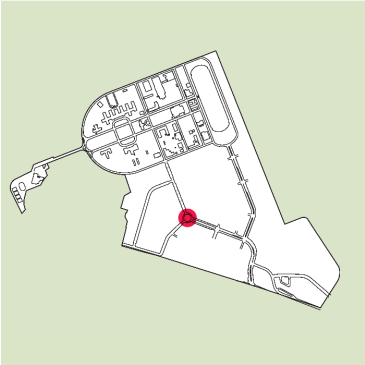
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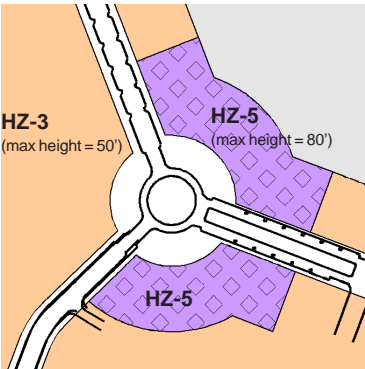
Height Zone Diagram



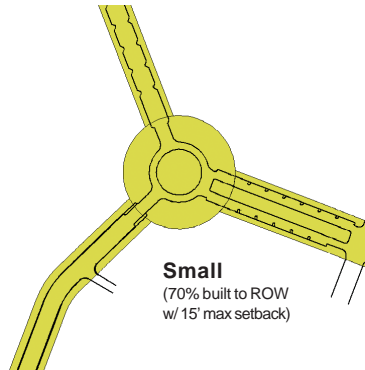
Setback Diagram



Keymap



Height Zone Diagram



Setback Diagram

### 3 – Town Center

The focal point of the site, the Town Center is a place for intimate gathering as well as a congregational space. It is park-like, and is both visually and audibly screened from the Highway 101. As the physical point where the Park’s partners meet, the Town Center is symbolically the most important part of the Park. It is the shared place where all people can come together, and enjoy an interchange of words and ideas.

Design of buildings and spaces which define the Town Center, as well as the uses which are planned within these buildings, must stimulate pedestrian-oriented activity and encourage interaction among the members of the NRP community. As a result, the Town Center has the highest building density of the Park. Buildings here have a maximum height of 80 feet and are required to have a minimum setback.

#### ***Building Uses/Types***

Like McCord Avenue Extension, the Town Center will provide a mix of goods, services, entertainment,

educational, and office support functions with the ground floor of all buildings devoted to “active” uses, such as retail, restaurants, theater or lecture hall lobbies, health clubs and public galleries. This includes all buildings on the Town Center, including the University buildings and the Lab Project buildings.



## 4 – McCord Avenue Extension: Retail Frontage

Like the Town Center, McCord Avenue Extension will be a hub of activity and a meeting ground for the diverse population of researchers, students and visitors to the NRP. Unlike the Town Center, however, McCord Avenue Extension is a linear street that will function much like the “Main Street” of a small city, providing for the needs of the entire 2000-acre Ames Research Park Center.

McCord Avenue Extension is an active, intensely pedestrian-oriented street, emphasized by its wide sidewalks, and single driving lanes. Activities meet the street here and are intensified in the “in-between” spaces, the open areas between buildings. These spaces also serve as other, secondary University entrances, connecting the street with the inner pathways and courtyards of the University.

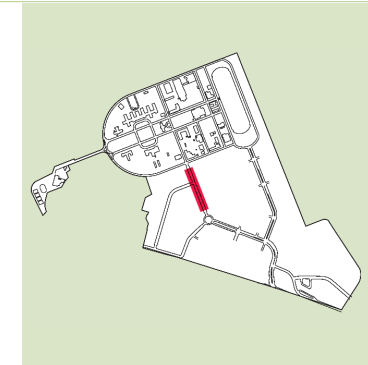
The design of the buildings should promote this pedestrian activity and interaction, and provide an attractive environment for economic activity, and

leisure activities. On-street parking will be provided along McCord Avenue to further activate and improve upon the pedestrian scale of this area. The small setback required for all buildings on McCord Avenue Extension will help create this intimate and urban street.

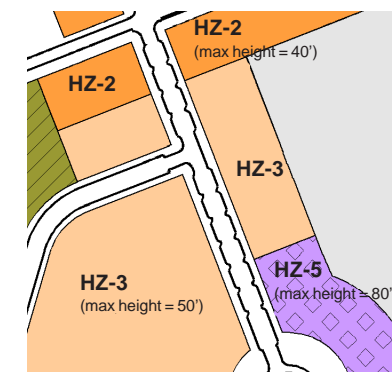
McCord Avenue Extension also serves as a transition from the Town Center to the historic district of NASA. Therefore, careful attention should be given to the building massing along this street. The height and density of buildings decrease as one goes north on McCord Avenue Extension to meet Wescoat Road, with a maximum height of 40 feet at the point of intersection.

### ***Building Uses/Types***

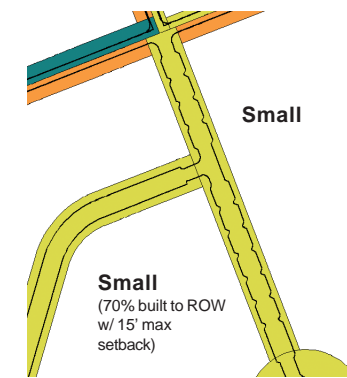
In order to ensure a lively street, new development along McCord Avenue Extension must be carefully configured to provide a mix of appropriate uses. Retail, restaurants, coffee shops, and other support services are examples as to what can be provided here.



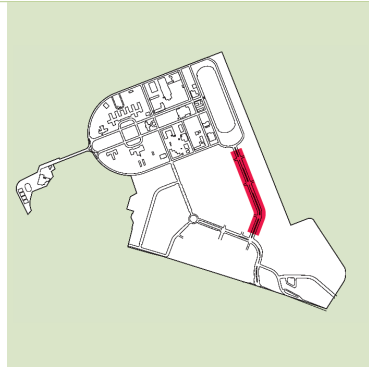
Keymap



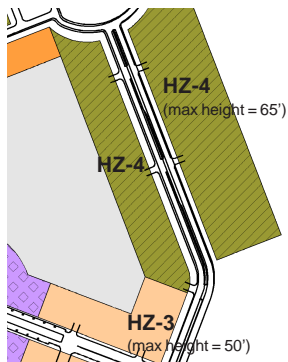
Height Zone Diagram



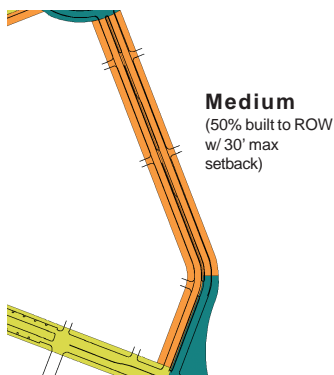
Setback Diagram



Keymap



Height Zone Diagram



Setback Diagram

## 5 – Cody Road: Through Traffic Circulation

Cody Road is the main street toward the Computer History Museum and Hangar One, and provides secondary access to the University parcels. Scaled to the monumental Hangar and the neighboring expanse of the Burrowing Owl Preserve, Cody Road is larger than the other roads at the Research Park. Its size is also designed to accommodate an expected higher volume of vehicular traffic, particularly for special events. Nonetheless, safe pedestrian and bicycle routes will be provided, particularly between the Light Rail Station and the NRP.

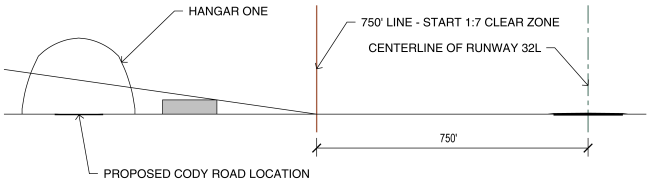
It is intended that buildings that line the street will provide an attractive edge to the corridor leading to the Hangar and the Museums. However, buildings along the street have varied setbacks to allow for the provision of informal pockets of plantings, thereby extending the informal landscape character of the adjacent Burrowing Owl habitat.

The scale of buildings will vary, with a maximum

height of 65 feet. However, the close proximity of the airfield to Cody Road means that all buildings located here must also comply with Federal Aviation Administration (FAA) regulations for buildings adjacent to the airfield zone. The regulation stipulates that building heights must fall below a line that has a slope of 1:7 beginning 750' from the center of the airfield runway.

### Building Uses/Types

University-related buildings will dominate the western edge of Cody Road while the large Burrowing Owl Preserve will dominate the east. Commercial development may occur east of Cody Road between the Burrowing Owl Preserve and the Computer History Museum. At the terminus of Cody will be the Hangar One Plaza, joining the Hangar and the Computer History Museum with the street.



Airfield Height Restriction Requirement

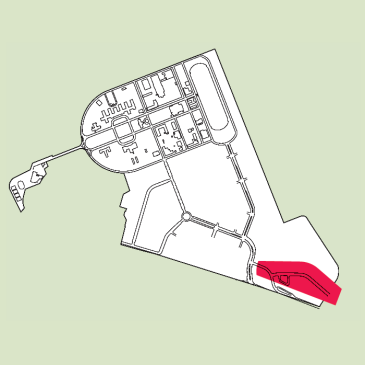
## 6 – Light Rail Station-Open Space Preserve

As the population of the NASA Research Park grows and the Transportation Demand Management Program is implemented, many employees, students, and visitors to the NRP may opt for alternative means of commuting. This multi-modal rail and transit station will be the point of entry for these, and therefore, careful consideration of the design of the facilities must be taken.

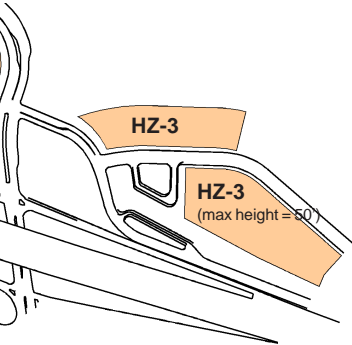
The connection between the station and the Park is equally important as that between the station and the surrounding area. Therefore, the pedestrian path linking the two will be convenient, safe, and aesthetically inviting. An outdoor plaza that serves the light rail station will be one end of a “green chain” that further connects parts of the campus. See *Open Space Concept* and *Plaza Concept* for detailed description.

### Building Uses/Types

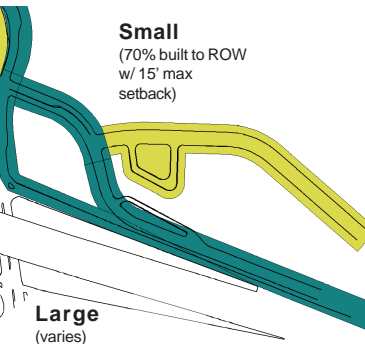
The station will include vehicle park and ride, small retail services such as coffee and snacks, bicycle storage, shuttle, local bus, and pedestrian facilities. In addition, major parking support for NRP will be located here in order to reduce traffic within NRP.



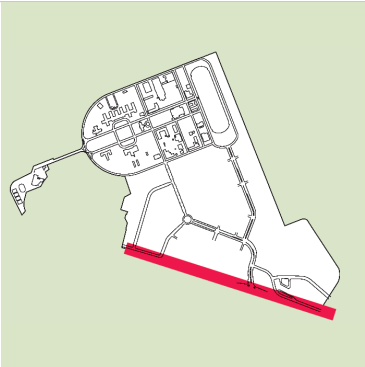
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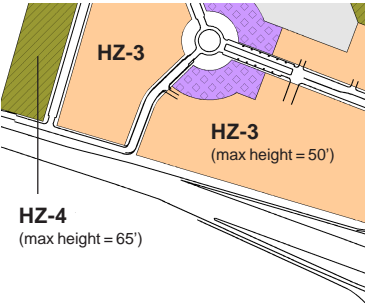
Height Zone Diagram



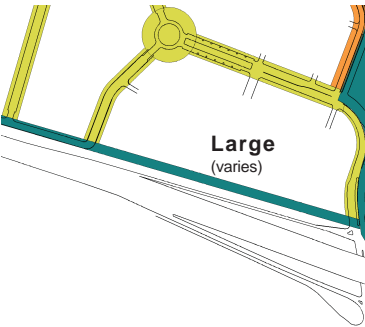
Setback Diagram



Keymap



Height Zone Diagram



Setback Diagram

## 7 – US Highway 101 Buffer

The US Highway 101 edge defines the image for NRP from the major regional transportation corridor. Landscape design along the buffer will hide the utilitarian functions such as parking and service areas along Highway 101 from public view.

The character of the existing landscape buffer with dense vegetation and varied species will be continued. The scale of the buffer will be high and dense enough to screen the presence of parking garages from highway view. Additionally, it will help reduce unwanted traffic noise.

### ***Building Uses/Types***

NASA Research Park buildings located near the US 101 freeway establish a design character and image for the area as seen from surrounding neighborhoods and from a highly traveled regional access route. Their importance in contributing to a dramatic and attractive research center along the US 101 freeway should also be recognized. Issues of building placement, façade materials and height are

all important in this consideration. In general, buildings along the freeway should be visually interesting, articulated, and generally light in tone, and should avoid the use of reflective glass.

# BUILDING ZONES: HISTORIC DISTRICT

Moffett Field's Central Historic Area is the Research Park's most memorable district. Its clear, powerful arrangement of buildings and spaces has remained intact for 50 years, testimony to the strength of the original Master Plan concept.

Of equal importance to the original Master Plan's spatial organization is the consistent architectural vocabulary of the district's Spanish Colonial Revival buildings. Most of these buildings date to the founding of the Naval Station in 1933, providing a valued link with its history.

This central district is designated as the Park's "Historic District", calling attention to its history, original Master Plan Concept and Spanish Colonial Revival architectural heritage.

## Guidelines

The Historic District's Spanish Colonial Revival buildings have a restrained massing pattern that breaks large masses and long elevations into

smaller elements, giving them a comfortable scale. This massing pattern is used throughout the older part of the district, giving the area the feeling that its buildings have similar size and bulk.

The massing pattern of the older buildings on Shenandoah Plaza should be followed for all new buildings and building additions in the district, from Clark Road to Cummins Avenue. Refer to the Historic Resource Protection Plan for more information.

- Maintain consistent building heights at two stories plus allowance for roof forms. A maximum height of 40 feet (inclusive of the roof form) should be observed. If a taller building is required, reduce it to two stories facing the street with the highest portion in the rear.
- Single story buildings should not be built in the district.
- The block between Severyns and Cummins Avenues has potential for larger building masses. This would develop a better transition to the scale of Hangar One. In this block, three

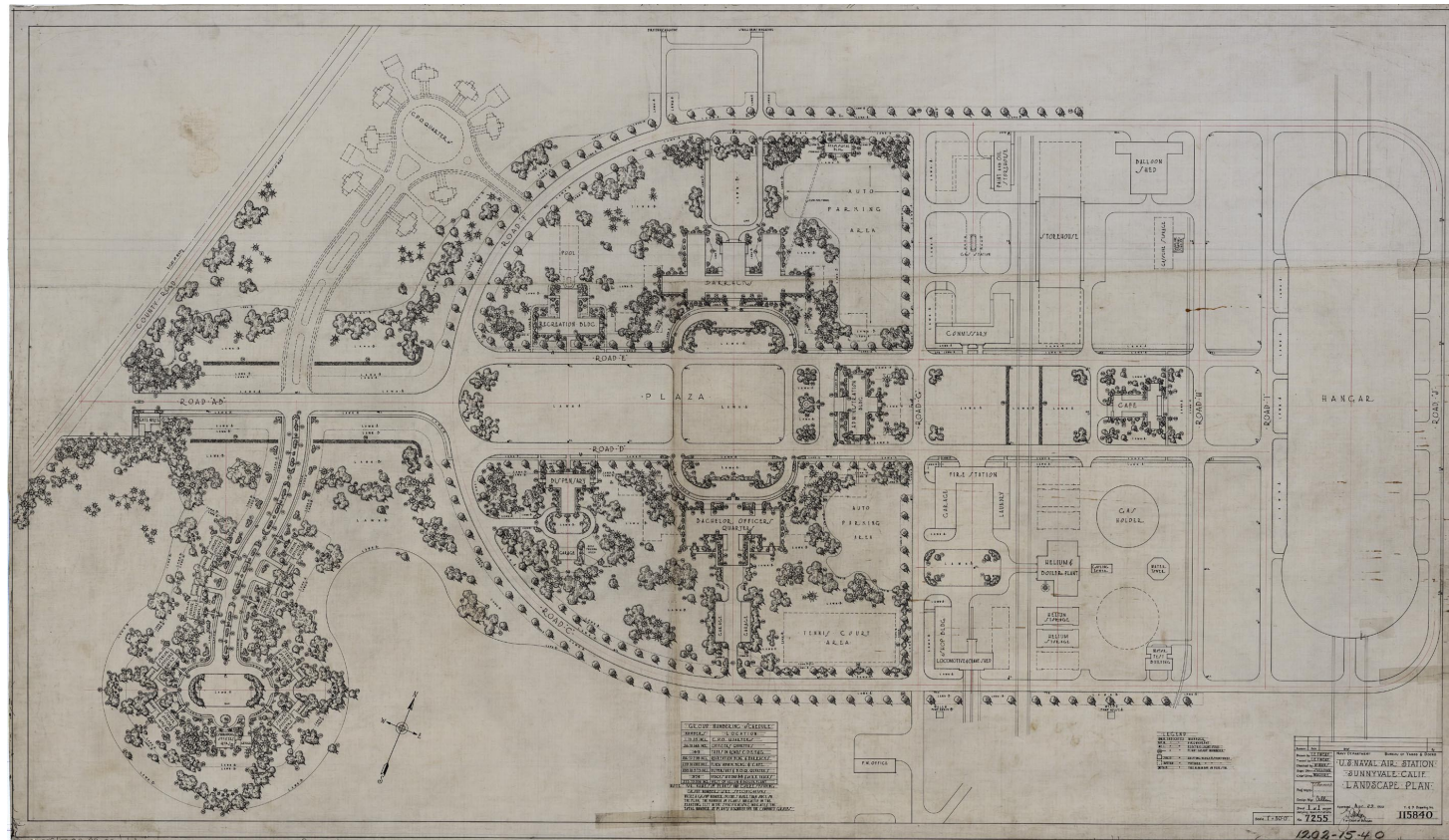


*Crew Headquarters, 1944*



*Central Historic Area*





Shenandoah Plaza: 1933 Master Plan

and four story buildings are encouraged. The block in front of the former Officer's Club should be reserved for future development as open space.

- Break long building masses into smaller mass elements. Continuous walls longer than 100 feet should be broken with setbacks, projections or other means of interrupting their bulk.
- Any undertaking in the Historic District shall be coordinated with the NASA Ames Historic Preservation Officer to ensure compliance with the Historic Resource Protection Plan.

## 8 – Historic District

### Transition I: Wescoat Road

Importantly, Wescoat Road provides the seam between the historic district on the north side of the street and the new development that will occur on the south side of the street. Therefore, future developments within this district must carefully merge the requirements of the two areas. Buildings within the historic district on the north side of the street should be constructed of materials and of a scale wholly compatible with that of the existing historic structures. Buildings will have a maximum height of 40 feet, which increases to 65 feet when adjacent to Hangar One. This increase in density is emphasized with the setback requirements, which become smaller as one approaches Hangar One.

The south side of Wescoat Road forms a transition from the low scale vernacular of the historic district to the denser, large-scale University precincts of the Research Park to the south. New construction in this transition area may be larger and denser than that in

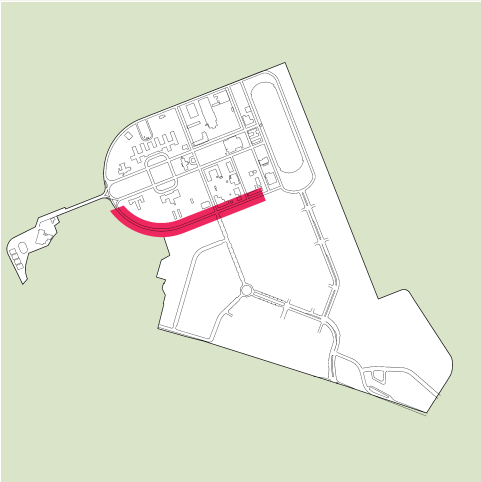
the Historic District, yet its scale, bulk, setbacks, building spacing and landscaping should relate such that the entire Wescoat Road subdistrict feels unified and compatible with the Historic District. Therefore, no buildings higher than 40 feet are allowed in this area.

Low levels of traffic are expected on Wescoat Road, making this a quiet and pleasant street. Additionally, formal landscaping along the street will recall the original 1933 Master Plan.

#### ***Building Uses/Types***

Buildings north of Wescoat Road consist of historic buildings that are used as office space. However, parts of the future Conference and Training Center will be located adjacent to Hangar One, on the northern edge of Wescoat Road.

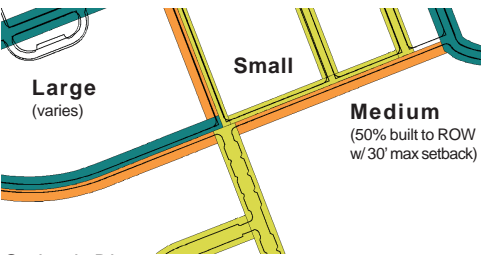
The southern edge of Wescoat will predominantly consist of University buildings. A parking structure is planned on the western side of this part of Wescoat.



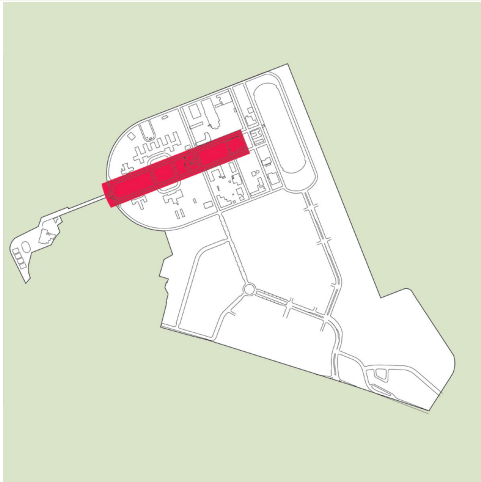
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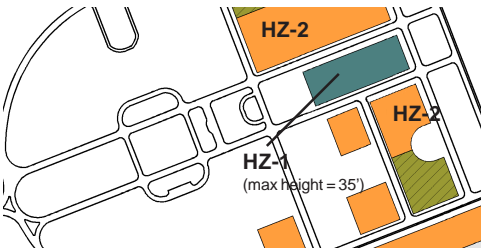
Height Zone Diagram



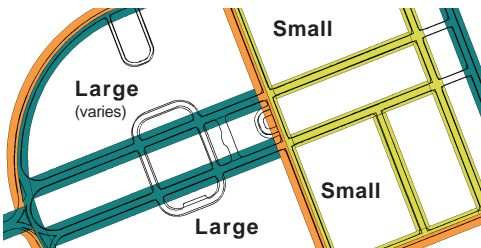
Setback Diagram



Keymap



Height Zone Diagram



Setback Diagram

## 9 – North and South Akron

North and South Akron define the grid pattern of the historic district. These linear streets surround a large green that terminates at Hangar One. The ceremonial feel of this zone lends itself as ideal for parades, for which it is used on occasion. With the Hangar One Plaza as their eastern terminus, North and South Akron also serve as a transition between the surrounding area and the new Plaza.

The setback requirements for this zone allow for greater density as one travels to the Hangar. However, a low building height requirement is maintained within the green open space to conserve the view toward the Hangar.

### ***Building Uses/Types***

Historic buildings 17, 19, and 20 dominate the western end of these streets. Many of the buildings on the eastern end will be demolished to make space for the new Conference and Training Center, which will be comprised of Conference rooms, overnight accommodations, and a gymnasium.

## 10 – Historic District

### Transition II: Bushnell

The north edge of the historic district, defined by Bushnell Road, will serve as the border between the NRP and NASA’s Ames Research Center. Located on this road will be one of the primary security gates to the Ames Center. As a result, a security fence will be installed on the northern side of Bushnell, with no sidewalk provided.

Medium to large setbacks are allowed on Bushnell, maintaining the low-density feel of the historic district. The new construction that will occur along Bushnell Road next to the Hangar will have an allowable maximum height of 65 feet.

#### Building Uses/Types

As stated, the northern edge of Bushnell Road will be part of NASA’s Ames Campus. To the south of Bushnell, Building 19 will remain as is, while some of the buildings to its east are planned for demolition. They will be replaced by the Conference and

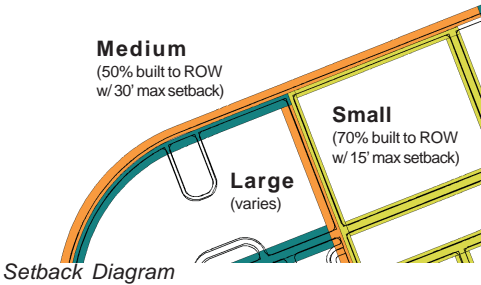
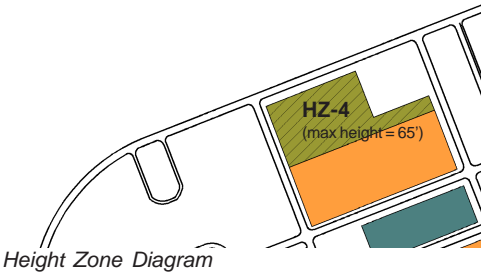
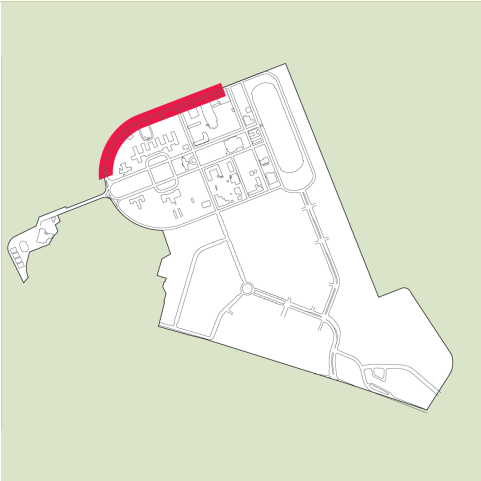
Training Center.

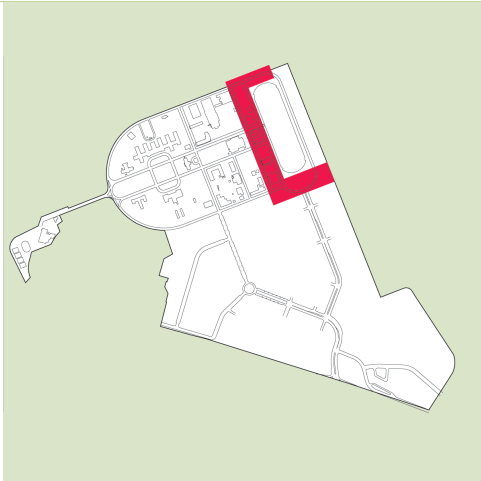
## 11 – Hangar One Plaza: Severyns Avenue

This zone, which surrounds Hangar One, will be converted into a large plaza. It also serves as a transition zone, engaging Cody Road with the historic district. It will be a public space for gathering, particularly for special events. The Plaza, with its large setback requirement will provide an appropriately scaled setting for the large Hangar.

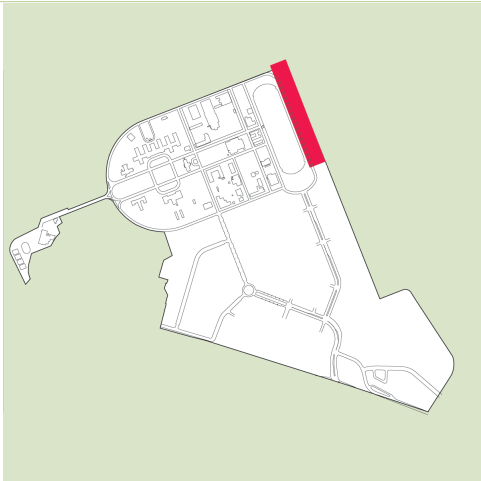
#### Building Uses/Types

Many of the existing buildings on both sides of Severyns Avenue are planned for removal. The Conference and Training Center will be located along the western side of Severyns. No building construction is allowed on the eastern side of the street, to allow for the Plaza, which will preserve views to the Hangar. However, because of the Plaza’s central location, a major transit stop for the NASA Research Park’s shuttle is planned for the area.





Keymap



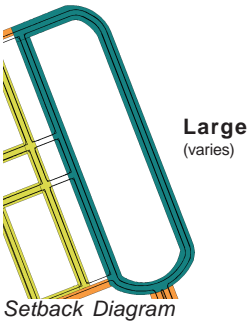
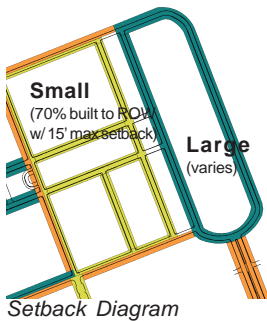
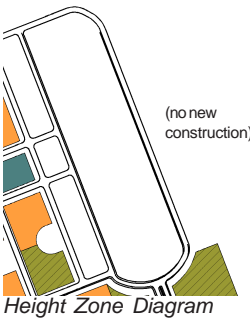
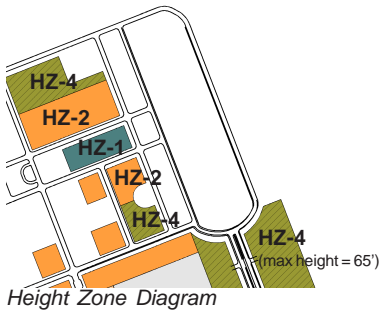
Keymap

## 12 – Hangar One-Airfield

This zone is the transition from the NRP to the airfield and beyond. There will be minimal landscaping, in order to preserve the large open area for special events, such as air shows.

### *Building Uses/Types*

Most of this area will be used for surface parking. No further building construction will occur here.





# SERVICE ENTRIES/LOADING

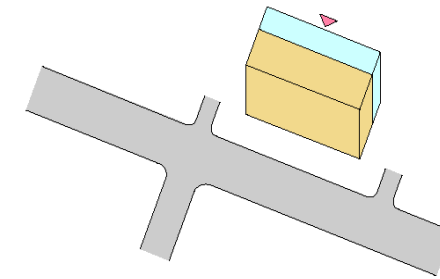
## Vehicular Access and Loading

In order to preserve the continuity and quality of the pedestrian environment, curb cuts for parking and service uses are not permitted directly off of Ellis Street Extension, McCord Avenue Extension and Cody Road. Loading and service vehicles must use secondary roads or feeders off of the main arterial roads.

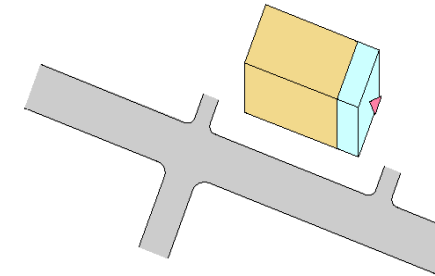
### Loading

Off-street loading spaces shall be provided per gross square feet of floor area as indicated in the chart. Service and loading docks shall be screened from streets and adjacent uses. For multi-parcel developments, loading spaces can be aggregated. The NASA Design Review Board, based on a development-specific basis, may establish a lower ratio. Loading spaces shall not occur on the primary street frontage.

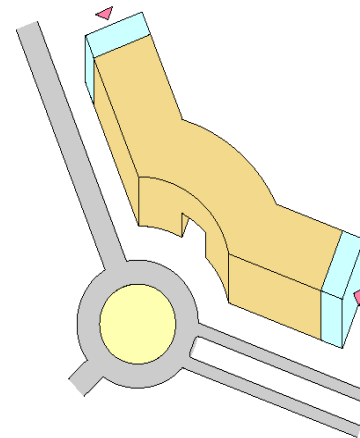
- The dimension of loading spaces shall be at least 10' wide by 35' long by 14' clear.
- Loading areas and all refuse storage and



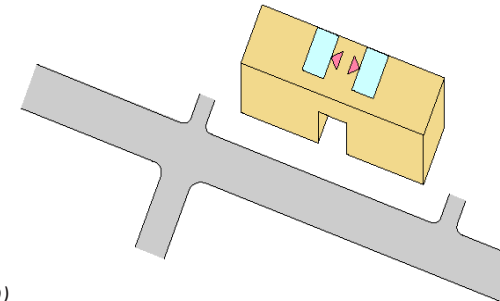
(A)



(B)



(C)



(D)

*Service Access Locations: Generally, loading zones and service entries shall be located on the back of buildings with access through private roadways (A). In some cases, loading zones may be organized off of secondary roads (B). If accessibility of secondary roads is not possible, gateways may be architecturally integrated into building figure allowing access from inside or back of building (C, D).*

Use	Spaces	Gross Floor Area
Commercial	1 Space	0 - 150,000
	2 Spaces	150,000 - 300,000
	3 Spaces	300,001 - 450,000
	4 Spaces	Over 450,000 plus 1 for each additional 300,000
Retail	1 Space	0 - 10,000
	2 Spaces	10,001 - 50,000

Loading Dock Space Requirements

dumpsters shall be out of view from pedestrian areas.

- Spaces for refuse storage, recycling bins, and dumpsters shall be in addition to the required loading spaces.



Yerba Buena Center for Photography, San Francisco  
The translucent paneling and integrated text make this service entry visually interesting.



South of Market Street (SOMA), San Francisco  
This service entry is well incorporated into the architecture of the building it serves.



Museum of Modern Art (MOMA), San Francisco  
This service dock is recessed from the street and integrated into the overall massing of the building.

# SUSTAINABLE DESIGN

At the building level, development shall adhere to all applicable laws and regulations, and develop structures according to the Leadership in Energy and Environmental Design Green Building System (LEED). LEED, developed by the U.S. Green Building Council, evaluates a building's environmental performance over its life cycle, and assigns credits to projects for satisfying a list of criteria. The System provides a definitive standard for what constitutes a "green building" by awarding different levels of green building certification based on the total credits earned. Partners should strive for the highest possible LEED rating in their building design, and meet at least the minimum required score to achieve LEED Certification. More information on LEED is available at <http://www.usgbc.org/programs>.

## Implementation

- Introduce sustainable strategies into the design process early. Incorporate and clearly state target requirements in the project construction documents.
- Use life-cycle cost analysis in the development

process.

- Incorporate flexible design to reduce the waste generated from future remodeling.
- Provide consumer operating and maintenance information for best performance in this project through careful planning, specification, metering, job site management, and lab supervision.

## Resource Efficiency

- Minimize the amount of energy required during construction and operation by using resource efficient construction techniques, building systems (including HVAC, heating, electrical, water, lighting, heat-pumps and boilers), insulation, fixtures, appliances, and controls.
- Optimize building performance and system control strategies (e.g. occupancy sensors and air quality alarms).
- Employ solar and other renewable energy sources.
- Conserve water with systems that reduce consumption and recycle water through

reclamation and treatment systems.

- Improve water quality (e.g. eliminate lead-bearing products in potable water systems)
- Maximize the reduction, reuse, recycling, or composting of waste and scrap materials.
- Minimize waste, spillage, pilferage, spoil and misuse of building materials.
- Consider adaptive reuse, rather than demolition, whenever possible.
- Reuse or recycle demolished building materials whenever possible.
- Establish collection and recycling centers.

## Procurement

*Note that this may not apply to all partners.*

- Follow federal Comprehensive Procurement Guidelines (<http://www.epa.gov/epaoswer/non-hw/procure/>) for building materials and products, and select materials that have a long-life cycle; select least toxic materials; select recyclable materials; select materials that are resource-efficient; select materials with the

maximum recycled content; select materials harvested on a sustained yield basis; select products causing the least pollution during their manufacture, use and reuse.

- Give preference to locally produced products and other products with low embodied energy content.
- Provide contractors with information about the Comprehensive Procurement Guidelines (<http://www.epa.gov/epaoswer/non-hw/procure/>) and require adherence with guidelines in all contracts.

### Indoor Environmental Quality

- Supply adequate levels of ventilation and outside air.
- Provide a healthy environment by reducing or eliminating the use or release of toxins and pollutants during building construction or operation.
- Use low VOC (Volatile Organic Compounds) paints, sealants, adhesives and other materials;

- Reduce indoor levels of Radon gas and formaldehyde emissions by following industry and USEPA guidelines on indoor environmental quality.
- Provide thermal comfort with a maximum degree of personal control over temperature and humidity.
- Control noise through sound absorbing material and equipment isolation;
- Control disturbing odors through contaminant isolation and careful selection of cleaning products.
- Enhance lighting quality by integrating natural and artificial lighting.

### Transportation

- Install showers for use by bikers and walkers.

## Response to Climate

### *Sunlight*

The Design Standards outlined in this document have been developed with the intent of encouraging new developments to ensure sunlight access to public open spaces and limit the area and duration under shadow. Complying with the Design Guidelines will reasonably limit areas of shadow on public open spaces during the active months (March–September) of the year and during peak hours (10 a.m.-4 p.m.) of the day. Standards determining the form and siting of buildings include:

- **Height**  
Base and Mid-Rise Heights  
Height Zones
- **Bulk**
- **Setbacks**
- **Lot Coverage**  
Maximum Coverage
- **Streetwall**  
Minimum Streetwall Length

Maximum Continuous Length  
Minimum Streetwall Height  
Streetwall Variation

See sections *Building Massing* and *Building Heights and Setbacks* for specific guidelines for the above.

If a project applicant requests approval for an exception to the above design standards, shadow analysis is required. The amount of area shadowed, the duration of the shadow, and the importance of sunlight to the use patterns of open spaces should be taken into account when determining the impact of shadows from development. A project for which an exception is sought shall not create additional areas of public open space in continuous shadow for periods of more than one hour, as determined by shadow analysis using the following guidelines:

- Shadow analysis should study the area of public open space in continuous shadow for periods of more than one hour, during the most active months of the year (March–September) and during the most active

- times of the day (10 a.m.–4 p.m.).
- Analysis for a specific development proposal should take into account aggregate shadow impacts from all buildings over 30' in height adjacent to public open spaces. For the purpose of shadow analysis, undeveloped sites should be analyzed using either an approved building design for future development or a design that resembles the maximum allowable building envelope for that parcel.

**Wind Analysis**

Wind analysis will be required for all projects that include buildings over 75' in height. The wind analysis test may be waived, if upon review by a qualified wind consultant, and with concurrence by the NASA Design Review Board, it is determined that the exposure, massing, and orientation of the building are such that adverse wind impacts will not occur. Wind analysis shall be conducted to assess

wind conditions for the project in conjunction with the anticipated pattern of development on surrounding blocks. The objective shall be to use all feasible means to eliminate wind hazards and to reduce adverse wind impacts, including uncomfortable wind conditions. Prevailing breezes travel from the west to the east through the site.

- Western facades can be modulated through the use of architectural devices such as surface articulation, variation of planes, wall surfaces, and heights, as well as the placement of stepbacks, courtyards, plazas, and other features.
- Landscaping in appropriate locations can be used to mitigate wind. Porous materials, such as vegetation, hedges, screens, latticework, perforated or expanded metal, offer superior wind shelter as compared to a solid surface. Such wind sheltering elements should be located west of the area being protected, and should be of sufficient height.



- Breezeways or notches, particularly at the building's main entrance or at the upwind corners of the building should be avoided.
- Building stepbacks can be used to mitigate ground level wind accelerations. If these stepbacks are used as terraces, they are likely to need properly designed wind screening elements or even partial enclosure to ensure usability and comfort. Any wind-sheltering strategy should address the likely significant downward component of these winds, particularly below west-facing building elements.



# APPENDIX

# DESIGN SUBMITTAL REQUIREMENTS

## General Requirements

The NASA Design Review Board has been established to ensure that development within the NASA Research Park conforms to the requirements set forth in this Design Guide. The Board may, at its discretion, grant variances to the standards contained in the Design Guide when the applicant demonstrates that the standards unreasonably limit conformance to the intent of the guidelines or where the applicant is able to show an equivalent means of meeting the intent. Such modifications shall be consistent with the public health, safety, welfare, and environmental protection.

## Submittal Procedure

Formal submittals shall be made to the NRP Design Review Board at the following schedule milestones:

- Conceptual Design (15%)
- Design Development (30%)
- Construction Document (90%)

Informal or preliminary reviews will be provided contingent on availability of the Design Review Board staff. Formal presentations to the Board may

be required for the Conceptual Design and Design Development Submittals.

The Board may reject the submittal, approve the submittal with conditions or approve as submitted. Incomplete submittals will be returned without review. Rejected submittals must be resubmitted with complete new packages.

A one-time submittal fee will be required with the Conceptual Design submission package. The submittal package drawings shall include one set of electronic documentation in .dxf or .dwg format, one full size set of prints mounted on foam-core and 5 half-size sets of prints edge bound. Five sets of written exhibits shall be included in 8 ½ x 11 hard copies and Microsoft Word electronic format. Photos and/or color copies of models, renderings and sample boards will be required for the Board's records.

Document	Scale
Master Plan Parcel Site Plan	1' = 100'-0"
Building/Garage Site Plan (Includes Landscape)	1' = 20'-0"
Conceptual Floor Plan(s)	1/8" = 1'-0"
Conceptual Roof Plan	1/8" = 1'-0"
Parking Plan(s)	1/8" = 1'-0"
Exterior Elevations (All Facades)	1/8" = 1'-0"
Building Sections (Minimum of Two)	1/8" = 1'-0"
Colors and Materials	--
Massing Model	1" = 50'-0"
Design Guideline Compliance Checklist	--
Building Data Summary Including Square Footages	--

## Conceptual Design Submission Package

Documents provided shall indicate the conceptual design of the proposed project. The minimum submittal requirements are as shown.



## Design Development Submission Package

Documents provided shall indicate refinements to the design and modifications to the conceptual design package.

Document	Scale
Master Plan Parcel Site Plan	1' = 100'-0"
Building/Garage Site Plan	1' = 20'-0"
Landscape Plan	1' = 20'-0"
Exterior Signage and Lighting Plan	1' = 20'-0"
Floor Plan(s)	1/8" = 1'-0"
Roof Plan	1/8" = 1'-0"
Parking Plan(s)	1/8" = 1'-0"
Rendered Exterior Elevations (All Facades)	1/8" = 1'-0"
Building Sections (Minimum of Two)	1/8" = 1'-0"
Colors and Materials Board with Actual Samples	--
Perspective Rendering or Rendered Model	1' = 50'-0"
Design Guideline Compliance Checklist	--
Structural and MEP Systems Description	--
Building Data Summary Including Square Footages	--

Document	Scale
Construction Documents	Appropriate Scales
Specifications and Materials List	--
Colors and Materials Board (If Revised)	--
Final Rendering or Rendered Model (If Revised)	1" = 50'-0"
Final Design Guideline Compliance Checklist	--
Building Data Summary Including Square Footages	--
LEED Checklist	--

## Construction Document Submission Package

Documents provided shall indicate complete construction drawings and details including modifications to the design development package. The Board's review shall be to establish design consistency with the previously approved documents.

## Design Revisions and Schedule

All design modifications to the approved plans affecting the exterior appearance of the project shall be submitted to the Design Review Board prior to construction of any of the modifications.

The NASA Design Review Board will process each submittal in a timely manner. In general, the Board will endeavor to complete each review in 21 business days from the date of receipt of the package. The Board will provide review comments to applicant in writing.

# DEFINITION OF TERMS

The following definitions apply to certain terms used in the Design Guide.

**Articulation:** Variation in the massing, setback, height, or design features of a building. Examples include vertical recesses, changes in wall plane, changes in apparent height, changes in materials, colors and textures, changes in façade recesses and projections, changes in floor levels, changes in roof forms, parapets, or cornice treatments, changes in the shape of location of garage and residential entries, or changes in window forms and patterns.

**Awning:** A light roof-like structure, supported entirely by the exterior wall of a building; consisting of a fixed or movable frame covered with cloth, plastic, metal or glass; extending over doors, windows, and/or show windows; with the purpose of providing protection from sun and rain and/or embellishment of the façade.

**Base Height:** The first tier in the overall height of buildings within the Plan Area as prescribed in the

Height Zone Chart and Diagram included herein.

**Building:** Any structure having a roof supported by columns or walls intended for permanent occupancy.

**Building Base:** Architectural term used in the guidelines to describe the portion of a building typically consisting of the first floor or first two floors and usually associated with its relationship to human scale.

**Building Height:** Building height is the vertical distance between finished grade and the top of a building. The allowable height of a building is specified by the Height Zones in which the building is located. Building top is defined as the top of the finished roof in the case of a flat roof, and the average height of the rise in the case of a pitched or stepped roof (See *Building Heights and Setbacks*). On sloping sites, this measurement is taken at the median grade height for each building face. Total building height is calculated by determining the average height of all individual building faces. Exemptions to building height include:

- Mechanical equipment and appurtenances necessary to the operation or maintenance of the building
- Enclosed space related to the recreational and/or community use of the roof, not to exceed 20 feet in height above roof level.
- Ornamental and symbolic features of buildings, including towers, spires, cupolas, domes where such features are not used for human occupancy.

**Bulk:** These standards specify the maximum dimensions of upper stories of new buildings. Standards include: maximum diagonal, maximum plan dimension, and maximum floor plate area.

**Canopy:** A light roof-like structure, supported by the exterior wall of a building and/or on columns, consisting of a fixed or movable frame covered with approved cloth, plastic, metal or glass, extending over entrance doorways only, with the purpose of providing protection from sun and rain and embellishment of the façade.

**Connector:** Term used to describe a pedestrian path along a street linking open spaces within the NASA Research Park.

**Corner:** The first fifty feet of a block measured from the intersection of two or more streets.

**Court:** Any space on a lot other than a yard which, from a point not more than two feet above the floor line of the lowest story in the building on the lot in which there are windows from rooms abutting and served by the court, is open and unobstructed to the sky, except for obstructions permitted herein. An “outer court” is a court, one entire side or end of which is bounded by a front setback, a rear yard, a side yard, a front lot line, a street, or an alley. An “inner court” is any court that is not an outer court.

**Developable Area:** Developable Area shall be the net area of land excluding dedicated streets, public open space, and view corridors.

**Dwelling Unit:** A room or suite of two or more rooms that is designed for residential occupancy for 32

consecutive days or more, with or without shared living spaces, such as kitchens, dining facilities or bathrooms.

**EIFS:** Exterior Insulation and Finish Systems

**Façade:** Exterior walls of a building which are adjacent to or front on a street, mid-block walkway, park, or plaza.  
.

**Floor Area, Gross:** The sum of the gross areas of the several floors of a building or buildings, measured from the exterior faces of exterior walls or from the centerlines of walls separating two buildings.

Where columns are outside and separated from an exterior wall (curtain wall) which encloses the building space or are otherwise so arranged that the curtain wall is clearly separate from the structural members, the exterior face of the curtain wall shall be the line of measurement, and the area of the columns themselves at each floor shall also be counted.

- A Except as specifically excluded in this definition, “gross floor area” shall include, although not be limited to, the following:
- 1 Basement and cellar space, including tenants’ storage areas and all other space except that used only for storage or services necessary to the operation or maintenance of the building itself.
  - 2 Elevator shafts, stairwells, exit enclosures and smoke-proof enclosures, at each floor.
  - 3 Floor space in penthouses except as specifically excluded in this definition.
  - 4 Attic space (whether or not a floor has been laid) capable of being made into habitable space.
  - 5 Floor space in balconies or mezzanines in the interior of the building.
  - 6 Floor space in open or roofed porches, arcades or exterior balconies, if such porch, arcade or balcony is located above the ground floor or first floor of occupancy above basement or garage and is used as the primary access to the interior space it serves.
  - 7 Floor space in accessory buildings, except for

<p>floor spaces used for accessory off-street parking or loading spaces as described herein, and driveways, and maneuvering areas incidental thereto.</p>		<p>less than a full floor level, provided that the mechanical equipment, appurtenances and areas are permanently separated from occupied floor areas and in aggregate area do not exceed the area of an average floor as determined by the NASA Design Review Board.</p>	
8	Any other floor space not specifically excluded in this definition.	5	Outside stairs to the first floor of occupancy at the face of the building served by the stairs.
B	“Gross floor area” shall not include the following:	6	Floor space used for accessory off-street parking and loading spaces and driveways and maneuvering areas incidental thereto.
1	Basement and cellar space used only for storage or services necessary to the operation or maintenance of the building itself.	7	Arcades, plazas, walkways, porches, breezeways, porticos and similar features (whether roofed or not), at or near street level, accessible to the general public and not substantially enclosed by exterior walls; and accessways to public transit lines, if open for use by the general public; all exclusive of areas devoted to sales, service, display , and other activities other than movement of persons.
2	Attic space not capable of being made into habitable space.	8	Balconies, porches, roof decks, terraces, courts and similar features, except those used for primary access as described in Paragraph A-6 above, provided that:
3	Elevator or stair penthouses, accessory water tanks or cooling towers, and other mechanical equipment, appurtenances and areas necessary to the operation or maintenance of the building itself, if located at the top of the building or separated therefrom only by other space not included in the gross floor area.	a	If more than 70 percent of the perimeter of such an area is enclosed, either by building walls (exclusive of a railing or parapet not more than three feet six inches high) or by such walls and interior lot lines, and the clear space is 15 feet or more in either dimensions, the area shall not be excluded from gross floor area unless it is fully open to the sky (except for roof eaves, cornices or belt courses which project no more than two feet from the face of the building wall).
4	Mechanical equipment, appurtenances and areas, necessary to the operation or maintenance of the building itself (I) if located on a number of intermediate stories occupying	b	If more than 70 percent of the perimeter of such an area is enclosed, either by building walls (exclusive of a railing or parapet not more than three feet six inches high), or by such walls and interior lot lines, and the clear space is 15 feet or more in both dimensions, (1) the area shall be excluded from gross floor area if it is fully open to the sky (except for roof eaves, cornices or belt courses which project no more than two feet from the face of the building wall), and (2) the area may have roofed areas along its perimeter which are also excluded from



- gross floor area if the minimum clear open space between any such roof and the opposite wall or roof (whichever is closer) is maintained at 15 feet (with the above exceptions) and the roofed area does not exceed 10 feet in depth; (3) in addition, when the clear open area exceeds 625 square feet, a canopy, gazebo, or similar roofed structure without walls may cover up to 10 percent of such open space without being counted as gross floor area.
- c If, however, 70 percent or less of the perimeter of such an area is enclosed by building walls (exclusive of a railing or parapet not more than three feet six inches high) or by such walls and interior lot lines, and the open side or sides face on a yard, street or court whose dimensions satisfy the requirements of this Design Guide and all other applicable codes for instances in which required windows face upon such yard street or court, the area may be roofed to the extent permitted by such codes in instances in which required windows are

involved.

- 9 On lower, nonresidential floors, elevator shafts and other life-support systems serving exclusively the residential uses on the upper floors of a building.

**Floor Area Leasable:** Leasable Floor Area means Floor Rentable Area, as defined and calculated in the 1996 Building Owners Management Association International publication, “Standard Method For Measuring Floor Area in Office Buildings.”

**Floor Area Occupied:** Floor area devoted to, or capable of being devoted to, a principal or conditional use and its accessory uses. For purposes of computation, “occupied floor area” shall consist of the gross floor area, as defined herein, minus the following:

- A Nonaccessory parking and loading spaces and driveways, and maneuvering areas incidental thereto;
- B Exterior walls of the building;
- C Mechanical equipment, appurtenances and areas, necessary to the operation or

maintenance of the building itself, wherever located in the building;

- D Restrooms, and space for storage and services necessary to the operation and maintenance of the building itself, wherever located in the building;
- E Space in a retail store for management, show windows and dressing rooms, and for incidental repairs, processing, packaging and stockroom storage of merchandise for sale on the premises; and
- F Incidental storage space for the convenience of tenants.

**Floor Area Ratio:** The ratio of the gross floor area of buildings to the developable land area measured for Commercial, Institutional, and Residential areas as described in the NASA Ames Development Plan. In cases in which portions of the gross floor area of a building project horizontally beyond the lot lines, all such projecting gross floor area shall also be included in determining the floor area ratio.

**Frontage:** Building width along a street, park, or plaza.

**GFRC:** Glass Fiber Reinforced Concrete.

**Lot:** A block, or subdivision thereof, that is under one ownership.

**Marquee:** A permanent roofed structure attached to and supported entirely by a building; including any object or decoration attached to or part of said marquee; no part of which shall be used for occupancy or storage; with the purpose of providing protection from sun and rain or embellishment of the façade.

**Massing:** The exterior shape of a building or structure.

**Mid-block Lane:** A pedestrian-oriented walkway through a development project.

**Midrise Height:** The second tier in the overall height of buildings within the NASA Research Park as

prescribed in the Height Zone Charts and Diagrams.

**Modulation:** Major variations in the massing, height, or setback of a building.

**Parcel:** Same as lot.

**Parking:** A parking facility serving uses located on either parcels or blocks occupied by said facility or on other parcels or blocks.

**Plan Dimensions:** The linear horizontal dimensions of a building or structure, at a given level, between the outside surfaces of its exterior walls. The “length” of building or structure is the greatest plan dimension parallel to an exterior wall or walls, and is equivalent to the horizontal dimension of the corresponding elevation of the building or structure at that level. The “diagonal dimension” of a building or structure is the plan dimension between the two most separated points on the exterior walls.

**Principal Facades:** Exterior walls of a building which are adjacent to or front on a public street, park or

plaza.

**Right-of-way (ROW):** Legal boundaries of the width of streets. Includes vehicular and pedestrian access and tree planting strips.

**Setback:** The distance between the edge of a building and the public right-of-way.

**SHPO:** State Historic Preservation Office.

**Story:** That portion of a building, except a mezzanine as defined in the Uniform Building Code (in effect as of the adoption of these Design Guidelines), included between the surface of any floor and the surface of the next floor above it, or if there is no floor above it, then the space between the surface of the floor and the ceiling next above it.

**Story, Ground:** The lowest story of a building, other than a basement or cellar as defined in the Uniform Building Code (in effect as of the adoption of these Guidelines).

- Street:** A right-of-way permanently dedicated to common and general use by the public, as described in the Plan Area Project Boundary, Development Block and Street Grid Maps.
- Streetwall:** Continuous façade of buildings generally built along the property line facing a street or open space.
- Structure:** Anything constructed or erected which requires fixed location on the ground or attachment to something having fixed location on the ground.
- Swale:** A low tract of land, especially when moist or marshy.
- VOC:** Volatile Organic Compound

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Schmidt, Marjorie. *Growing California Native Plants*. University of California Press, 1980.

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Applicable federal and state regulatory drivers addressing sustainability include, but are not limited to:

**Federal**

- 42 U.S.C. 6901, Resource Conservation and Recovery Act
- 42 U.S.C. 8251 et. seq. Federal Energy Management
- 42 U.S.C. 13101 – 13109 Pollution Prevention Act of 1990

- Executive Order 12856 “Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements”
- Executive Order 12873 “Federal Acquisition, Recycling and Waste Prevention”
- Executive Order 12902 “Energy Efficiency and Water Conservation at Federal Facilities”
- Executive Order 13101 “Greening the Government Through Waste Prevention, Recycling and Federal Acquisition”
- Executive Order 13123 “Greening the Government Through Efficient Energy Management”
- Executive Order 13148 “Greening the Government Through Leadership in Environmental Management”
- Executive Order 13150 “Federal Workforce Transportation”
- Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds
- 40 CFR Part 247, Comprehensive Procurement Guideline

- 10 CFR Part 435, Energy Conservation Voluntary Performance Standards for New Buildings; Mandatory for Federal Buildings
- U. S. Energy Policy Act of 1992 (EPACT)

**State**

- California Code of Regulations Title 13, Air Resources Board
- California Code of Regulations Title 22, Environmental Health
- California Code of Regulations Title 23, Waters
- California Code of Regulations Title 24 Part 6, California's Energy Efficiency Standards for Residential and Nonresidential Buildings
- California Health and Safety Code

**NASA**

- NASA Strategy Document, Environmental Excellence for the 21<sup>st</sup> Century
- NPD 8500.1 "NASA Environmental Management"
- APD 8800.4 "Ames Environmental Policy Document"
- APG 8800.3 "Ames Environmental Procedures and Guidelines"

In particular, the following executive orders require federal facilities to apply sustainable design principles to new facility construction.

EO 13123, Greening the Government Through Efficient Energy Management, directs Agencies to:

- Apply sustainable design principles to new facility construction
- Optimize energy, environmental, and life-cycle costs associated with construction, operation, and decommissioning of facilities
- Incorporate lease provisions that encourage energy and water efficiency wherever life-cycle cost-effective (including renegotiations or extension of existing leases)
  - GSA Guidance on Energy, Environmental and Sustainable Design in Lease Acquisition issued July 18, 2000
  - Mandatory for GSA; recommended for other agencies
  - Available at [www.ofee.gov/html/energy.htm](http://www.ofee.gov/html/energy.htm)

EO 13101, Greening the Government Through Waste Prevention, Recycling and Federal Acquisition, directs Agencies to:

- Use recycled content and environmentally preferable products
- Consider environmental factors in developing plans, drawings, work statements, specifications, or other product descriptions, including:
  - Waste prevention;
  - Recyclability;
  - Use of recycled content, environmentally preferable, and biobased products;
  - Life cycle cost; and
  - Ultimate disposal



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